

# THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—21ST YEAR.

SYDNEY, SATURDAY, MARCH 10, 1934.

No. 10.

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### THE CORRELATION OF X RAY AND CLINICAL FINDINGS IN THE DIAGNOSIS OF CHEST DISEASES.<sup>1</sup>

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AND

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In expressing thanks to the members of the Branch for the honour and privilege of addressing you this evening, we are fully alive to the fact that the subject is an intricate one, and it has necessitated many months of preparation by observation and collating of material. To do it full justice in a short discourse is beyond the bounds of possibility. Like Ithuriel, we can touch lightly only on many problems. In

our aim, therefore, to avoid abstruseness and to attain simplicity, reference to a large bibliography will not be retailed. The subject needs no apology, for in chest diseases, more than in any other regional field of pathology, X rays have become the spearhead of diagnosis. Yet in our fervour for accurate diagnosis by vision alone, we may tend *ipso facto* to over-estimate their value and miss our mark. Let us remember that the spearhead must have its shaft so as to acquire true trajectory and aim. The shaft, indeed, is general clinical investigation and wisdom born of the experience of the family physician. The X ray spearhead of the radiologist may touch the spot of pathology, but its diagnostic accuracy and power are directed by the intelligent discrimination of the physician or surgeon attending the patient.

William Stokes, a most distinguished son of Trinity College, Dublin, where this year's British Medical Association annual meeting was held, said one hundred years ago that the advocates of the then recently invented stethoscope were objected

<sup>1</sup> Read at a meeting of the Victorian Branch of the British Medical Association on September 6, 1933.

to because they tended to disregard all knowledge gained previous to the introduction of auscultation. Any experienced physician today may well cast an analogous taunt in the teeth of some modern practitioners who rely too much, if not entirely, on X ray diagnostic methods in suspected chest lesions.

The object of this paper is to present to you the results of X ray investigation of one thousand consecutive cases in private practice and to attempt to assess its relative value as a diagnostic medium for the physician and surgeon. Private patients only have been chosen for statistical purposes because it is realized that private patients are always referred to the radiologist for a definite reason, as distinct from public hospital patients who may be sent for X ray examination as the last resort of weary and harassed honorary medical officers. Also, it is for the interest of the private practitioner rather than the hospital clinician that these figures are published.

#### X Rays in Relation to Other Means of Investigation.

Where, then, do X rays take their place in relation to other methods of investigation? Before the advent of efficient thoracic radiography, pathological change in this region during life was very much a matter of guess work. Indeed, this rested almost entirely on the microscope (that is, examination of the products of needling and of the sputum), obviously a comparatively limited medium in the search for truth. By the correlation of X ray findings with clinical signs and symptoms we can now give a reasonable assessment of the nature of a lesion, and by radiographic investigation alone we can give an accurate assessment of its location, size and distribution.

We must bear in mind that when we are aware that an abdominal tumour of unknown origin is present, we can do a laparotomy. It is obvious that on no account could a thoracotomy become the answer to a note of interrogation in the same way as that in which an abdominal incision was and is used by surgeons when an abdominal lump can be felt. Also, we must realize that our sense of touch, expressed technically as palpation and second only to vision as a diagnostic medium, is not in our armamentarium in dealing with pulmonary tumours. As an offset to this, lesions in the lungs have a background of air to accentuate their shadows on films, whereas abdominal lesions can rarely be delineated without contrast media: these latter outline filling defects in a negative way; pulmonary lesions are positive.

The frequency with which physical signs not only do not tally with X ray findings, but are absolutely antagonistic, is extraordinary. This occurs in patients of very experienced physicians, so that we are convinced that physical signs are of very little value and that history and symptoms are a much more reliable guide, particularly in tuberculosis. Those gods of our student days, inspection, palpation, percussion and auscultation, have been knocked from their pedestals. This iconoclasm does not strike at the personal factor in these forms of examination, but at methods which are, at their best, time-consuming, clumsy and in the main inaccurate. They certainly have their use, but it has become very restricted. Thus vision has come to our aid to deliver us from

stumbling blindly in an intricate maze of pulmonary signs and symptoms. But although it is now nearly forty years since Röntgen discovered X rays, only within recent years have we been able by their use to obtain reliable data in the determination of the normal and pathological anatomy of the lungs on films.

#### The Interpretation of Films.

The greatest advance latterly has been the improvement in technique, which has now become standardized wherever possible throughout the world. The essence of this technique is the combination of long distance between tube and patient, ordinarily now 180 centimetres (72 inches), and high speed exposure—one-tenth or less of a second. In most of the cases referred to this evening X ray examination was carried out by this method. Therefore, as far as possible there has been uniformity of a technique which is recognized universally as producing the best diagnostic film.

The first desideratum, then, for the radiographic interpretation of chest diseases is a good film. A bad film can be neatly and concisely summed up in the Latin tag "*ignotum per ignotius*". Nowhere, indeed, could an issue confounded be still more confounded than in obtaining diagnostic data from the reading of a bad film. A physician making a diagnosis from such a film passes beyond the confines of accuracy and certainty to cross the frontiers into speculation and ingenuity, country beset with pitfalls and snares for the physician and catastrophe for the patient. The physicians' presentation of fictitious ideas and opinions result in, no doubt unwittingly, what may be termed in a phrase of Sir Walter Raleigh as "grave imperturbable lying". To call vascular nodules an early infiltration may not harm the patient's health, but it will certainly harm his hygienic prestige, both subjectively and objectively, not to mention the effect on his banking account.

A great responsibility rests on the radiologist in distinguishing the normal from the abnormal. In considering the differentiation of the normal from the slightly abnormal and the nature of lesions causing opacities or unusual radiolucencies, we are brought to our second desideratum, to wit, an intimate and thorough knowledge of the shadow anatomy of normal and pathological lungs. Too often does one hear blood vessels seen end-on called nodules; heavy vascular markings called fibrosis, congestion labelled miliary tubercles, and dense muscle shadows looked upon as caused by pleural thickenings. You may be certain that much oftener are non-existent lesions found than are actual pathological changes missed.

What do we see on the film of a normal lung? Let us recapitulate the gross anatomy of this viscus. There are lobes and lobules, blood vessels, lymphatics, air passages and cells, interlobar septa, pleura, glands. Of these anatomical components all we see as distinct entities on films are the blood vessels and the bronchi seen end-on as round rings. Very often the right upper interlobar septum is clearly visible. With regard to blood vessels the density of their shadows is dependent (excluding technique) on two interrelated factors: (i) The diameter of the

vessel or the depth of the column of blood, (ii) the distance of the blood vessel from the film.

A column of blood seen in a film exposed at a short distance from the tube is grossly distorted and liable to be misinterpreted. The vascular problem is a very real one. The congestion of bronchitis and of cardiac disease, particularly mitral stenosis, and that secondary to sinus infection must be carefully distinguished from miliary tuberculosis and silicosis.

Passing on to pathological anatomy, this may be described as almost invariably a transformation of the negative into the positive: a migration of structures from the realms of the invisible to the visible. The potential pleural space may be obviously filled with fluid or air, the pleura may be thickened and visible, the finer structures of the lungs when collapsed in atelectasis now throw a shadow, enlarged glands may be delineated, bronchioles when dilated and filled with secretion become opaque.

#### The Value of Fluoroscopy.

Before proceeding to show the statistics we wish briefly to refer to the value of fluoroscopy. Often-times one is requested "just screen the lungs". It is very bad policy to carry out this injunction. Screening is almost entirely a preliminary and accessory method of examination to note the function of the diaphragm, and for the gross investigation of costo-phrenic angles, posterior mediastinal space, cardiac and aortic outlines from various angles, and the nature of the lung fields. The only occasion on which it may be made the sole method of investigation is in assessing the degree of therapeutic pneumothorax. Early tuberculosis can be very easily missed by using fluoroscopy alone.

#### Statistics.

The number of pathological conditions in one thousand patients is set out in Tables I and II.

TABLE I.

Showing Cases in which a Pathological Diagnosis was Made.

Condition.	Number of Cases.
Recent tuberculosis .. .. .	141
Old tuberculosis .. .. .	55
Bronchitis .. .. .	36
Bronchiectasis .. .. .	19
Secondary carcinoma .. .. .	13
Tumours .. .. .	12
Hydatid cysts .. .. .	12
Pneumonia .. .. .	11
Abscess .. .. .	6
Silicosis .. .. .	5
Foreign body .. .. .	3

TABLE II.

Showing Cases in which Pathological Change was Undefined.

Condition.	Number of Cases.
Fluid .. .. .	36
Adenitis .. .. .	10
Thickened pleura .. .. .	10
Subphrenic pathological change .. .. .	6
Atelectasis .. .. .	3
Bulle .. .. .	1
Spontaneous pneumothorax .. .. .	1

The findings set out in these tables may be summarized as follows: There were 380 pathological cases=38% of the 1,000. Of these 380 cases, 196 were pulmonary (excluding pleural) tuberculosis=52%. Of these 196 cases, 141 were recent=72%.

Thus one in five of all those examined showed some evidences of tuberculosis, while 52% of the pathological conditions were tuberculous.

Obviously sputum confirmation was not possible in all these cases, but these are the ones in which it may be reasonably said that the true diagnosis was established.

#### The Diagnosis of Tuberculous Lesions.

It is our purpose to discover every tuberculous infection, the earlier the better, and not to label as tuberculous those patients who are not. The position diagnostically has been summarized by competent observers in this way.

1. Definite infiltration can be demonstrated upon the film at a very early stage of the disease, and frequently before definite physical signs are evident.

2. X ray evidence extending over a period of some months and consistently "negative" may be taken as conclusive evidence of the non-existence of pulmonary tuberculosis.

3. That in cases in which physical signs are present, it may be assumed that the initial stage has passed, and in such cases the X ray picture will show (as a rule) much more extensive disease than can be demonstrated by physical examination.

In interpreting the X ray film there are certain points to be kept constantly in mind: (i) The pathological change noted in the film may be obsolete and have no bearing on the present clinical problem. (ii) Allowance must be made for the extreme degree of "personal" variation found, depending on age, weight, and the cardio-vascular state of the patient.

What is the "basal" or basic pattern seen in the film? Is there any localized deviation from that pattern? Is there a localized nodular, "woolly", or patchy infiltration? Comparative films at intervals of a few weeks are of the utmost importance. In actual practice we often find disease on both sides when one only is suspected, or the lesion may be on the opposite side. This is quite understandable. The lesion is only rarely at the true apex, and generally begins in the second or third interspace, a site at which the changes are masked by the pectoral muscles in front, and by the scapula behind. Slides have been shown of the typical Assman's focus, a small rounded opacity, not very dense, easily mistaken for a hydatid. But, unlike a hydatid, it soon becomes less dense in the centre, and cavitation occurs in a great many of them, in not as high a proportion as 90% (overseas figures), but in a very large number. Progress films are essential once this focus breaks down, and spread above and below soon occurs. The so-called "pleural rings" are practically always cavities. Even in a disease such as tuberculosis, where the findings are so typical, it should be considered that the diagnosis is presumptive and not absolute until confirmed bacteriologically. This is true of all chest conditions. That is, every diagnosis should be regarded as presumptive until made



positive as by the recovery of the tubercle bacillus, or, say, a piece of malignant tissue per bronchoscope.

We must make sure that the diagnosis is adequate, both quantitatively and qualitatively. Thus pulmonary fibrosis may be present and have no bearing on the clinical condition of the patient. Particularly is this true of miners and (even more important) of returned soldiers.

The following cases illustrate the fact that it is in pulmonary tuberculosis that we recognize particularly the value of radiograms. There are exceptional cases of very early infection with the recognized syndrome of signs and symptoms aided by positive biological tests which give no positive radiographic evidence whatever. A physician would be very foolhardy indeed to allow normal X ray findings to override these positive clinical data. But these cases are very rare, indeed, and the reverse is much more common, as illustrated here:

1. A bilateral upper lobe infection occurred in a child of fourteen years. She was a contact of her mother, who died from phthisis. The child showed no positive signs or symptoms definitely pointing to pulmonary tuberculosis.

2. Twelve months ago in the second case the lungs were clear. In July, 1933, the patient complained of nausea and dyspepsia. During routine screening preparatory to a barium meal examination this condition of widespread bilateral pulmonary tuberculous infection was discovered. There were absolutely no signs referable to her lungs. She has since died.

3. The third case illustrates very well a widespread infection of considerable duration as evidenced by the cavitation which exhibits no signs at all. Before being examined by X rays she was examined by a very competent physician, and after viewing the films he and a *compère* were still baffled in trying to localize by signs, lesions of whose existence they were fully aware from the radiograms.

4. The fourth case illustrates a tragic factor that is very insidious. During the period of artificial pneumothorax a patient is well cared for and resistance is built up in every possible way so that as a result symptoms do not readily reveal themselves. This woman had been having air injections into her left pleural cavity for two and a quarter years. Suspicion arose about the condition of her right lung and widespread infection was revealed. She has since died. It should be an inviolable rule that the treatment of all patients undergoing a course of therapeutic pneumothorax should be controlled by frequent radiograms.

In presenting these cases of widespread infection recognized as tuberculous at a late stage, we are not being critical. They are brought to your notice merely as informative facts.

#### Malignant Disease of the Lung.

In passing on to a consideration of primary malignant disease of the lung, we note that the lobar type of primary lung carcinoma is comparatively easy to diagnose if comparative films are taken, but the hilar type (that is, where the growth originates near the tracheal bifurcation) is only possible of diagnosis by radiological or direct, that is, bronchoscopic, methods. When the growth originates in the lower half of the chest, pleural effusion is generally an early event, and it is important to recognize certain secondary changes which would lead one to suspect the presence of malignant disease even though the actual lesion was completely hidden by effusion.

If there is no displacement of the heart to the opposite side, and if the thoracic capacity as indicated by narrowing of rib interspaces is diminished, then

the possibility of malignant disease must be considered with underlying atelectasis of a lobe or lobes. Lipiodol instillation is, of course, of great value, and artificial pneumothorax may be advantageously employed in certain cases.

#### Benign Tumours.

Benign tumours are most commonly well defined. Most, if not all, of these benign growths are extrapulmonary, that is, they push the lung in from without. They usually arise from the periosteum of the rib or the endothoracic fascia. In this type of case with a superficial, rounded, well defined opacity artificial pneumothorax is indicated, the lung simply collapsing away from the opacity.

Teratomata have their origin from the remains of the thymus gland or third and fourth bronchial clefts.

#### Fluid in the Chest.

In our experience there is no class of case more difficult (excepting childhood infections and conditions in a chest on which operation has been performed) than that in which because of acute inflammation the contour and visibility of the diaphragm have gone, and in which fluid is suspected and has to be localized. The patient is very ill and the difficulties are very great. It is impossible to diagnose the pathological nature of an effusion by X rays. Of course, if there are other evidences of tuberculosis, such as a frank tuberculous infiltration, it is reasonable to assume that the effusion is tuberculous.

With an effusion of any great size the heart and mediastinum are displaced to the contralateral side and the diaphragm is not seen. The visibility of lung markings beneath an effusion is important, as lung markings are not visible in pneumonia. In pneumonia the interspaces are, if anything, narrowed, not widened as in simple effusion. If there is an underlying atelectasis spaces are narrowed. The heart is pushed to one side by the effusion and rotated. Most radiologists have, I think, abandoned the Bucky diaphragm for routine chest work, but in this class of case postero-anterior and lateral Bucky films are necessary. Particularly true is this in localized effusions and in hydatid with accompanying localized effusion. With encysted pleural effusions there may be underlying pathological change, such as hydatid disease, sarcoma of a rib, or endothelioma of the pleura which is indistinguishable from an encysted effusion.

#### Conclusion.

We want to emphasize the point that the chest radiologist is a chest pathologist, and that the obligation rests on the radiologist to make himself familiar with chest pathology generally. The obligation also rests on the physician to have a working knowledge of chest radiological findings, so that when radiologist and physician meet in conference, the greatest amount of information may be drawn from the combined clinical, pathological and radiological evidence at their command.

This inconclusive radiographic examination may require one or more of the following diagnostic methods to reach finality:



(i) Examination of sputum, (ii) needling, (iii) instillation of contrast media such as lipiodol, (iv) serial reexamination by X rays, (v) thoracotomy and sectioning of tumours, (vi) artificial pneumothorax, (vii) autopsy.

The following is an attempt to illustrate arbitrarily and not mathematically the relative value of X rays in the diagnosis of pulmonary disease.

Positive pathological diagnosis by X rays.	Diagnosis by X rays and other methods. by X rays very difficult.	Pathological diagnosis
Tuberculosis.		
Silicosis.		
Opaque foreign bodies.		
Secondary carcinoma.		
Emphysema	} Abnormal air.	
Pneumothorax		
Bulles		
Hydatid cysts.		
	Acute infections in adults.	
	} Hodgkin's disease. and mediastinal tumours. and late bronchial carcinoma. Bronchiectasis.	
	} Tumours { Fibroma. Teratoma. Endothelioma.	
	Syphilis.	
	Bronchial carcinoma (early).	
	Large effusions.	
	Acute infections in children.	
	Post-operative lung conditions.	

Our conclusions, therefore, are :

1. X rays are a powerful aid in the diagnosis of pulmonary lesions. They are, however, not by any means conclusive.

2. The history, the local and general symptoms, and general signs are very important for diagnosis.

3. Local physical signs in the chest are relatively unimportant for diagnosis.

4. The X ray appearances must be subjugated in many cases to biologic tests and symptoms.

5. Over 50% of pulmonary lesions in private patients are tuberculous.

6. The X rays are most valuable in tuberculosis and silicosis; and least in pleural and pleuritic effusions and in the post-operative lung conditions.

These conclusions are entirely personal, arbitrary and dogmatic, and we hope, provocative.

#### ŒSOPHAGEAL OBSTRUCTION.<sup>1</sup>

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We may divide œsophageal obstruction into the following types: (i) the congenital; (ii) that resulting from interference with the motor function, which includes, first, a few rare cases of paralysis of the œsophagus, and secondly, spasm and allied conditions; (iii) that caused by mechanical blocking of the lumen, either by pressure from without, simple or malignant structures arising in the wall itself, and lastly, foreign bodies. With foreign bodies I do not propose to deal tonight.

<sup>1</sup>Read at a meeting of the South Australian Branch of the British Medical Association on October 26, 1933.

#### CONGENITAL OBSTRUCTION.

The congenital malformations of the œsophagus are, of course, uncommon and usually prove fatal. The majority are accompanied by a fistula between the lower portion of the œsophagus and the trachea. Rarely one may have a membranous stricture or a definite narrowing of the whole circumference at one or more places. These constrictions are sometimes found in children opposite the seventh dorsal vertebrae.

Brown Kelly<sup>(1)</sup> in 1931 reported nine of these cases and considered that very frequently they were due to congenital shortening of the œsophagus, the portion between the stricture and diaphragm being really stomach. In support of this he removed the mucosa and found it corresponded in six of them with gastric mucosa. With the latter classes it is possible to do something and hence, when they do occur, œsophagoscopy should be carried out and, if possible, dilatation. Generally these children refuse to take the breast, and when given sips of fluids they are immediately regurgitated, accompanied by coughing and vomiting. In the case of a narrowing of the canal, symptoms may not be produced until after weaning, when the child is found unable to take solid food.

#### SPASM.

Spasm may occur anywhere in the course of the œsophagus, most commonly at either end, either as an hysterical manifestation or as a reflex condition caused by some irritative condition either in the œsophagus or some neighbouring organ, especially either the larynx or stomach. Two so-called spasmodic conditions deserve special mention.

#### Plummer-Vinson Syndrome.

The so-called Plummer-Vinson syndrome was first described at any length by Plummer, of the Mayo Clinic, in 1914. Cameron<sup>(2)</sup> in 1928 described this as characterized by glossitis and atrophy of the oral and pharyngeal mucosa, definite reduction in hæmoglobin percentage and some diminution of the number of red blood corpuscles, frequent enlargement of the spleen, and symptoms of dysphagia referred to the level of the larynx, with loss of appetite, debility and nervousness. Later observers have added to this syndrome achlorhydria and increased fragility of the red blood corpuscles. Nearly all the cases occur in middle-aged women.

Generally the dysphagia comes on gradually, there being at first long intermissions of normal deglutition. Finally, the diet is reduced to fluids and semi-solids, and great care has to be exercised to prevent food from sticking in the throat.

The mucosa of the mouth and pharynx is pale and the tongue smooth and devoid of papillae. Later the mucosa becomes atrophic and fissured.

The sphincter at the upper end of the œsophagus is found by the œsophagoscope to be in a state of spasm. About a quarter of the patients have enlargement of the spleen. The average hæmoglobin

is a little under 50% and the average red cell count almost exactly four millions, with no change in the white count. Most, though not all, of the patients have achlorhydria, but nine out of Cameron's twenty-five had free hydrochloric acid.

The Americans, Plummer, Vinson, Moersch, Connor, and Cameron, of Glasgow,<sup>(2) (3)</sup> think that the dysphagia is primary and the anæmia the result of the consequent curtailment of foods rich in iron and other essentials. They consider that the dysphagia is primarily due to a reflex spasm following inflammation of the nerve endings in the pharyngeal mucosa; an anxiety state follows which exaggerates and perpetuates the condition.

Graham and Johnson,<sup>(4)</sup> however, in January, 1933, advanced the theory that the dysphagia, although caused in the same way, was a late manifestation, the achlorhydria and blood condition being a much earlier manifestation. They state that the type of anæmia in these cases is a new and peculiar one of a specific type. It is not for me to venture any opinion on this aspect of the question.

The treatment of the dysphagia is suggestive, that is, the passage of the œsophagoscope or a mercury-filled bougie. The results are nearly always satisfactory. Graham and Johnson, although admitting that patients were able to eat ordinary food after the passage of the tube, differed from the other observers in that they considered that the anæmia did not improve rapidly unless iron was given. I have seen only three cases and all the patients did well.

#### Cardiospasm.

The so-called spasm occurring at the lower end, apparently unassociated with any obvious lesion, is known as cardiospasm or achalasia of the cardia.

The symptoms rarely occur in patients under twenty and seldom in those over forty years of age. The condition is about twice as common in females.

The dysphagia, which is the most prominent symptom, is very variable in its intensity and is subject in the earlier stages to remissions which may last for a year or more. After meals there is a sensation of discomfort in the epigastrium which is relieved at first by washing the food into the stomach with large draughts of water. Gradually, however, this becomes more difficult and regurgitation occurs with increasing frequency and in increasing amounts. This is accompanied by dilatation and hypertrophy of the œsophagus to as much as fifteen times its original volume (one hundred cubic centimetres).<sup>(5)</sup> The food retained becomes stale and more offensive and may measure as much as a pint. As a rule there is not much nausea, the "vomiting" being effortless and painless, and the fluid almost flows out. It may occur during sleep and cause distress through some of the vomit getting into the respiratory tract. Various symptoms may occur, due to the pressure on the heart, trachea or

bronchi, and these patients frequently suffer from various neuroses. Hurst states that the resistance of the unrelaxed cardiac sphincter can be overcome by a pressure of eight inches of water, and hence that in this condition, which he attributes to the failure of the sphincter to work, a pressure of food equal to eight inches of water is necessary before any can pass into the stomach.

The disease may last as long as thirty years with frequent remissions.<sup>(5)</sup> Rarely death may occur as a result of compression of some viscus or ulceration of the œsophagus. X ray examination shows the opaque fluid filling a regularly enlarged œsophagus and the smooth rounded or conical shape of its lower extremity.

œsophagoscopy will show the enlargement of the viscus, and as a rule the œsophagoscope will pass easily into the stomach through the sphincter. Occasionally, however, this is not so, owing, as Jackson and Vinson have pointed out, to kinking of this region by the weight of the dilated œsophagus above. In these cases a weighted bougie should be passed afterwards to test the patency of the cardiac canal. I slipped on one occasion through not realizing this fact and assumed that fibrosis and probably malignant disease were present. On the other hand, any small grade of stricture formation may prevent the passage of the bougie or, if the sagging of the œsophagus is marked, with its lowest point below the cardiac opening of the œsophagus, the bougie may curl up in the *cul-de-sac* that is formed and miss the opening.

#### Ætiology.

There are four theories as to the ætiology:

1. The first is that it is due to spasm of the cardiac sphincter.

2. Hurst<sup>(6)</sup> considers that it is due to degeneration of vagal terminations in Auerbach's plexus. He supposes a failure of the cardia to open rather than an actual spasm, and hence calls the condition achalasia of the cardia. If this is so, it is difficult to understand why improvement as well as relief follows bougie treatment.

3. Mosher<sup>(7)</sup> considers that cardiospasm is due: (a) To stricture of the terminal portion of the œsophagus somewhere within the cone of the diaphragm. Generally the stricture is single, but the whole liver tunnel may be narrowed. The stricture may be congenital internally or be due to external pressure or inflammation. (b) To falling of the diaphragm and release of the terminal portion of the œsophagus from its support, with formation of a trap.

4. Jackson<sup>(8) (9)</sup> adds to the above a spasm of the muscular fibres of the diaphragm which encircle the œsophagus.

Probably, as the editor of the *Medical Annual* says, the condition is a combination of all four types of the disease rather than a single entity.

*Treatment.*

There are four methods of treatment:

1. The passage of mercury-filled bougies. These are at first left in for a quarter of an hour before meals, but the time of retention and the frequency of usage are gradually reduced. As soon as possible the patients are taught to use them themselves and are supplied with one to take home. They then use it before meals when necessary.
2. Rapid dilatation of the cardiac canal with some form of dilator. This has occasionally been known to rupture the œsophagus and, furthermore, cannot be carried out by the patient himself.
3. Retrograde dilatation of the sphincter from the stomach. This, of course, is only resorted to when the other methods are not successful.
4. In severe cases, where there is sagging of the œsophagus or kinking of the canal, an operation similar to pyloroplasty or an œsophago-gastrostomy may be done.

*OBSTRUCTION CAUSED BY EXTERNAL PRESSURE.*

Obstruction may be caused by pressure from without on the œsophagus either in the neck or thorax.

(a) In the neck pressure may be caused by new growths of the larynx and trachea and enlargements of the thyroid gland. The so-called pulsion diverticulum generally causes pressure on the œsophagus in the neck, though sometimes it descends into the thorax. This condition generally arises in adult males and is situated on the posterior wall of the pharyngo-œsophageal junction, opposite the cricoid, between the transverse fibres forming the crico-pharyngeus muscle and the lower oblique fibres forming the main mass of the inferior constrictor. The sac then makes its way under the lateral cervical muscles generally on the left side and may be palpable or even visible in the neck.

Its possible presence is one of the reasons why I think an opaque meal should always be given in œsophageal conditions, as, although there is no excuse for pushing an œsophagoscope through the wall of the sac, it has happened and it is much safer to know what one is to expect.

The symptoms are those of gradually increasing dysphagia and a sensation as if a foreign body were present in the throat. In contradistinction to carcinoma, the patient generally has more difficulty with fluids than with solids, although this may be reversed in later stages. When the patient takes food the sac gradually fills to the accompaniment of a gradually increasing sense of discomfort, and finally the pressure of the distended sac may prevent further food passing down the œsophagus. Regurgitation later occurs, with the appearance of undigested food, and the obstruction is relieved. Some patients are able to relieve their symptoms by pressing on the sac in the neck and forcing it to empty itself. Other symptoms referable to pressure or to ulceration of the sac wall may also occur.

Radiological examination is the easiest and most certain method of diagnosis, the only likelihood of

confusion being with a picture given by a dilated œsophagus above an organic stricture.

It is better to give the patient a thread to swallow twenty-four hours before œsophagoscopy, as it is sometimes difficult to find the lumen of the œsophagus; the pouch is always entered easily.

The treatment is removal of the sac.

(b) Within the thorax an aneurysm of the arch of the aorta is the commonest cause of external pressure. Enlarged glands, whether of a chronic, inflammatory or malignant type, are also fairly common.

*NON-MALIGNANT STRICTURES.*

Intrinsic strictures of the œsophagus of a non-malignant type are nearly always due to caustic alkali burns. This condition occurs much more frequently in Germany and Hungary, where lye is used for home soap-making.<sup>(10)</sup> Strictures may also follow typhoid fever, diptheria, scarlet fever, syphilis, tuberculosis and trauma. Peptic ulcer of the lower end may be a cause.

Strictures due to caustics generally occur at the anatomical or physiological narrowings, most frequently at the level of the crossing of the bronchus, next in the region of the crico-pharyngeus, and next at the level of the hiatus in the diaphragm.

Esophagoscopy shows the œsophagus to be somewhat dilated above the stricture, the mucosa being reddened and sometimes ulcerated. The stricture itself is paler than normal mucosa.

*Symptoms.*

The immediate symptoms in strictures due to caustics are the result of the inflammatory reaction, swelling and ulceration, which produce inability to swallow. These generally subside within two weeks and swallowing becomes practically normal. Then, as healing with the formation of scar tissue and contraction of the lumen occurs, swallowing becomes increasingly difficult, until finally the patient may be unable to swallow his own saliva. Loss of weight due to insufficient nourishment, of course, occurs.

These patients, if left alone, nearly all die. Von Acker, in pre-œsophagoscopy days, considered that 40% to 50% of these strictures were fatal.<sup>(10)</sup>

The inflammatory symptoms must be treated by œsophagoscopy, lavage of the œsophagus, and administration of bismuth subnitrate and, if necessary, by a gastrostomy. This should always be preceded by swallowing a thread twenty-four hours before and in any case no obstruction should be allowed to become anywhere near complete without a thread being swallowed. This is the most important point in these cases and cannot be too strongly emphasized, as the patient's whole future and even life may depend upon it.

*Treatment.*

There are three methods of treatment of stricture.

*External Operative Methods.*—External operative methods are justifiable only in a case of complete



stricture, and then the mortality is so high that a permanent gastrostomy is preferable.

**Peroral Methods.**—Blind bouginage is, in my opinion, never justifiable these days. Trousseau's dictum that "sooner or later all cases of stricture of the œsophagus die of the bougie", although uttered in pre-œsophagoscopy days, is still true enough of this method. Peroral œsophagoscopic dilatation with bougies, preferably Jackson's, is more suitable, but, although I have one case apparently cured by this method, I do not think it is safe, except in single strictures of a mild degree. The method in use at the Mayo Clinic<sup>(11)</sup> of passing bougies over a thread swallowed the previous day is the safest and best of these types of treatment. It is, however, neither as safe nor as easy on the patient as retrograde bouginage with Tucker's bougies.

**Retrograde Bouginage.**—In retrograde bouginage a string is first passed through the nose and its lower end is brought to the surface through the gastrostomy opening after being picked up with a pillar retractor. A number 4 silk thread is finally attached to the original thread below and drawn into position. When required, the Tucker's bougies are attached to the lower end of the thread and drawn into position by pulling on a loop of thread which has been brought out of the patient's mouth. A new thread must, of course, be attached to the distal end of the bougie before this is done. The bougie is left in position as long as possible and is finally brought out through the mouth, removed, and the new thread drawn into position through the nostril to take the place of the old one.

The œsophagus should always be examined before dilatation is started. There are thirteen sizes of these bougies, ranging from 10 to 34 (French), and the treatment takes six months to two years. The gastrostomy opening should be kept open for six months after the œsophagus is fully dilated, and the œsophagus should always be examined again before it is allowed to close.

The advantages claimed for the method are:<sup>(10)</sup>

- (i) As the œsophagus is dilated above the stricture and cone-shaped below it, it is easier to enter the stricture from below.
- (ii) Patients will allow a bougie to remain in longer if pulled up from below.
- (iii) Anaesthesia and hospitalization are not required after the wound is healed.

#### CANCER OF THE OESOPHAGUS.

I took the trouble to look up cases of cancer of the œsophagus occurring at the Adelaide Hospital during the period 1926 to 1931 inclusive. During this time there were 51 cases—6 in women and 45 in men. Seven of the cases were at the upper end, 20 in the middle, and 13 in the lower end of the œsophagus. This corresponds to the usual frequency as far as position is concerned, although one or two observers have found the lower end more affected

than the middle, and this has been the case in my own patients. As far as the men were concerned, the youngest was 45 and the oldest 76 years of age, giving an average of 61.3; in the women, the youngest was 44 and the oldest 80, an average of 60.8. This is rather too high, as most statisticians give the average for women as about ten years younger. The duration of symptoms was given as from three weeks to twelve months, with an average of four and a half months.

In 1931 in the State of South Australia there were 18 cases of carcinoma of the œsophagus, 689 total cases of carcinoma and 4,884 total deaths. In 1932 there were 25 cases of carcinoma of the œsophagus, 654 cases of carcinoma, and 4,957 deaths. In other words, last year about 1 in 200 people died of carcinoma of the œsophagus, and in the previous year about 1 in 270.

#### Symptoms.

A comparative absence of symptoms in the early stages may be noted from the fact that the average duration is given as only four and a half months, whereas one knows from experience that the cases are generally well advanced when the patients are first seen. In my own cases definite stricture formation necessitating considerable dilatation before intubation could be done was present in all cases except one.

Dysphagia is, of course, by far the most common symptom. It is gradual in onset and progressive in type and has frequently reached a marked degree before the patient seeks advice. It is followed by excessive salivation, which, to my mind, is the most unpleasant feature of the disease, particularly when the obstruction reaches a degree which precludes the passage of fluids.

Vomiting appears as a rule fairly soon after the dysphagia, but its incidence rather depends on the care of the patient in masticating his food, that is, the more careless the patient, the earlier the vomiting will trouble him. We may have the symptoms of the presence of a foreign body, for instance, if he eats too big a piece of food. An attack of this sort may be the first thing that forces a patient to seek advice. Pain is not marked in my experience, except in the post-cricoid group and in the lower end group with involvement of the cardia, when the pain shoots around the left lower ribs. The patients do, however, usually complain of a heavy feeling behind the sternum.

Trotter and Hunter<sup>(12)</sup> divide the upper group into a post-cricoid subdivision characterized, they say, by early symptoms, namely, pain and dysphagia, and an upper œsophageal subdivision in which early signs, such as involvement of the recurrent laryngeal nerve and secondary glands, predominate.

In the middle group rupture into lung or pleura or formation of a tracheo-œsophageal fistula may occur. In one of the Adelaide Hospital cases cough followed by foul sputum was the first symptom.

X ray examinations will show the typical irregular or rat-tailed constriction of the lumen, and as a rule the diagnosis is simple. Other strictures are generally sharper and more clean cut. One must remember, however, that a positive X ray picture appears only when there is obstruction to the flow of barium or a sufficiently large ulcer crater to fill up and be shown. I have seen a patient told he had nothing wrong with him because of his X ray picture. Later he was found to have a carcinoma. Hence all people over forty-five with obstructive symptoms should be examined by the œsophagoscope.

There are two conditions which may give difficulty from the point of view of radiological diagnosis. One is the presence of a malignant or inflammatory condition in the mediastinum, which will give a similar appearance sometimes. One of the Adelaide Hospital cases followed on a removal of lip and glands twenty years previously, and had a mediastinal mass, although this was probably primary.

A patient of my own is an old lady who had a breast removed some years ago and who now has secondary deposits in the mediastinum. She has narrowing of the lumen, but no fibrosis or ulceration, and we have twice had to remove an impacted piece of meat.

The other difficulty arises with growths at the lower end. Here, in addition to ordinary epithelioma of the œsophagus, we may get involvement of the œsophagus by extension upwards of a spheroidal cell carcinoma of the stomach. This may even be found above the diaphragm. These patients frequently have a superadded spasm of the cardia and consequently you sometimes get a sharp-cut stricture and even an X ray diagnosis of spasm. The only way is to give the patient a weighted bougie to swallow and if spasm is present to keep an eye on the carcinoma while you treat the cardiospasm.

In my opinion by far the bigger proportion of carcinomata at the lower end of the œsophagus are in reality spheroidal cell growths beginning at the cardiac end of the stomach.

The diagnosis between cardiospasm and cancer of the stomach involving the cardia is assisted by the fact that in cancer the onset is more insidious, the dysphagia getting progressively worse without intermission until complete obstruction is established, whereas in cardiospasm the onset is comparatively sudden, remissions are the rule, and generally the obstruction is no worse after ten years than at the onset.

#### Treatment.

##### Radical Treatment.

An attempt should be made to remove growths situated at the upper end of the œsophagus. A sufficient number of cases have been reported with successful results to give this procedure a definite preference over any other method. With growths lower down, Torek's case is the only successful result, but attempts have not been many, and I fancy the percentage is as good as with radiation.

X rays have been practically useless in my experience, although they have been preferable to radium, and in one or two cases have seemed to give the patients a little more comfort and little longer life.

Guisez<sup>(8)</sup> is the only person who has reported any successful results with radium. He picks his cases very carefully, but even his results are frightful in proportion to numbers. He has reported three patients alive after five years. Furthermore, there is a considerable risk of perforation, and in most of the arrested cases a fibrotic stricture occurs. I propose in the next suitable case I get to suspend a large dose of radium into a Souttar's tube and to see whether I can get any better results.

Thoracotomy and insertion of radon seeds into the growth have been tried, but no satisfactory results have been reported. The insertion of radon seeds into the lumen is obviously too difficult to carry out thoroughly.

##### Palliative Treatment.

There are two methods open to us—gastrostomy and intubation. Souttar<sup>(13)(14)</sup> and Halloran<sup>(15)</sup> both give the average life after these as roughly three and six months respectively. The Adelaide Hospital gastrostomy patients in the series I have mentioned live only three to four weeks, but they were mostly operated on far too late. Although gastrostomy relieves the hunger and prolongs life, it fails to relieve the most distressing symptom, the vomiting which still follows in the swallowing of the excessively produced saliva; and as I do not regard prolongation of these people's lives as of any benefit in itself, I consider it falls far short of intubation which, when successful, totally relieves the pain.

There are, however, a certain number of cases in which a combination of the two methods is desirable—either too small a tube has been inserted or there is a tendency for one end to be blocked up with growth.

*Intubation.*—I use Souttar's tubes. These are made of German silver, are of a corkscrew shape and have a flange at the top to prevent the tube slipping through the growth.

A guide is first passed through the growth and over this the graded metal blunt-ended dilators are passed. Finally, the tube itself is passed and left in position with its upper end slightly above the upper level of the growth. The patient has very little after-effects and when insertion of the tube is successful he can generally swallow a fair amount within forty-eight hours. The tube is not used at the upper end on account of the effects of pressure on the surrounding strictures and it is liable to ulcerate through.

It must be remembered that when the tube is inserted at the lower end, if the patient has any gastric involvement, the tube may lie in a more vertical position than normal and that sometimes its lower end may be blocked by a growth in the stomach.

It is generally stated that the main objection to the method is the tendency of the tube to slip out. My cases have generally been too far advanced, and this happened only once. However, it does not matter if the tube does slip out, as dilatation effects a temporary improvement and one can insert it again later. The great trouble I find is to get the tube in, that is, to get a guide through the growth.

#### CASES.

In my series there were seventeen cases. I had a fibrous stricture at the upper end as well as a carcinoma lower down, and we were unable to get a large enough introducing œsophagoscope through. There were three deaths. One patient died of double pyo-pneumothorax the next day; the tube was in a good position, and Professor Cleland considered that pus was present previous to operation. The second patient died of hæmorrhage, and in the third case I pushed a guide and subsequently a tube into the lesser sac. One patient refused treatment. In four I was unable to get a guide through. I now realize that it would have been better in these cases, which were early in my series, to get the patient to swallow a thread and to use that as a guide. Eight cases were successful, the longest period of survival being six months, with an average of three. Two of these were patients who had previously been treated at the radium clinic with no improvement. I do not pretend that these results are anything remarkable, but I am perfectly sure that when one is able successfully to introduce a tube, the patient is infinitely more comfortable than if he is left alone or if a gastrostomy is performed.

#### REFERENCES.

- <sup>(1)</sup> A. Kelly Brown: "Congenital Abnormalities at the Upper End of the Œsophagus", *Journal of Laryngology and Otolaryngology*, Volume XLVI, 1931, page 521; and with Leonard Finlay: "Congenital Shortening of the Œsophagus", *Ibidem*, page 797.
- <sup>(2)</sup> J. A. Munro Cameron: "Dysphagia and Anæmia", *The Quarterly Journal of Medicine*, Volume XXII, 1928, page 43.
- <sup>(3)</sup> D. R. Patterson: "Obstruction at the Upper End of the Œsophagus", *Journal of Laryngology and Otolaryngology*, Volume XLVI, 1931, page 532.
- <sup>(4)</sup> George Graham and R. S. Johnson: "Anæmia with Dysphagia", *The Quarterly Journal of Medicine*, Volume I, 1932, page 41.
- <sup>(5)</sup> A. L. Abel: "Œsophageal Obstruction", 1929, page 78.
- <sup>(6)</sup> A. F. Hurst: "Achalasia of the Cardia", *The Quarterly Journal of Medicine*, Volume XXIII, 1930, page 491.
- <sup>(7)</sup> Chevalier Jackson and G. M. Coates: "Diseases of the Nose, Throat and Ear", 1929, page 1043.
- <sup>(8)</sup> Chevalier Jackson: "Bronchoscopy and Œsophagoscopy", 1927, page 333.
- <sup>(9)</sup> Chevalier Jackson: *Ibidem*, page 365.
- <sup>(10)</sup> Gabriel Tucker: "Strictures of the Œsophagus", *The Laryngoscope*, Volume XLI, 1931, page 426.
- <sup>(11)</sup> Porter F. Vinson: "Management of Cicatricial Strictures of the Œsophagus", *Surgery, Gynecology and Obstetrics*, Volume XXXVIII, 1924, page 543.
- <sup>(12)</sup> Wilfred Trotter: "Discussion on Malignant Disease of the Hypopharynx", *Journal of Laryngology and Otolaryngology*, Volume XLVII, page 262.
- <sup>(13)</sup> H. S. Souttar: "A Method of Intubating the Œsophagus for Malignant Stricture", *The British Medical Journal*, May 3, 1924, page 752.
- <sup>(14)</sup> H. S. Souttar: "Treatment of Carcinoma of the Œsophagus", *The British Journal of Surgery*, Volume XV, 1927, page 76.
- <sup>(15)</sup> Garnet Halloran: "Observations on the Treatment of Œsophageal Cancer", *THE MEDICAL JOURNAL OF AUSTRALIA*, February 11, 1933, page 173.

#### REACTIONS PRODUCED BY HYDNOCARPATES IN CHRONIC PULMONARY TUBERCULOSIS.

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CHAULMOOGRA, hydnocarpus and cod liver oil derivatives have proved valuable in the treatment of leprosy. The beneficial effect is ascribed to the active fatty acid constituents of these substances having a structural affinity for the waxy envelope of the Hansen's bacillus. The destruction of this envelope either directly leads to the death of the bacilli or renders them susceptible to the phylactic power of the body which is sufficient to destroy them. The morphological similarity of the human tubercle bacillus to the Hansen's bacillus raises the question as to whether some similar reactions to the hydnocarpates *et cetera* might not be obtained in tuberculosis.

*In vitro* experiments show the hydnocarpates to have a definite bactericidal effect on tubercle bacilli. Professor Lyle Cummins has shown that "Alepol" (mainly sodium hydnocarpate) in a dilution of 1 in 1,000,000 only has a growth-inhibiting and probably bactericidal effect on tubercle bacilli growing in Besredka egg medium.<sup>(1)</sup> Other workers have found hydnocarpates in a dilution of 1 in 100,000 to 1 in 1,000,000 to inhibit the growth of avian tubercle bacilli.<sup>(2)</sup>

Variable results have been obtained from the therapeutic use in tuberculosis of the morrhuates (fatty acid derivatives of cod liver oil of similar structure to the chaulmoogra oil series). The favourable results have mostly been obtained in surgical tuberculosis. However, ethyl morrhuate was tried at the Robroyston Hospital,<sup>(3)</sup> but after treating forty-six patients with non-pulmonary tuberculosis it was abandoned and considered "an agent powerless to influence tuberculosis in any way". Turning to pulmonary tuberculosis, Dr. R. M. Mitchell tells me he has tried injections of sodium morrhuate at the State Sanatorium, Wooroloo, Western Australia. Focal and general reactions were obtained, but on leaving off treatment these subsided and there was no beneficial effect noticeable on the later course of the disease. The beneficial effect of cod liver oil in tuberculosis is most probably due to its influence on the general nutrition of the body.

It is interesting to note that Sir Leonard Rogers has reported the successful treatment of a case of chronic *lupus vulgaris* with intradermal injections of ester morrhuates and hydnocarpates.<sup>(4)</sup>

#### Clinical Investigations.

Considering that further trial of hydnocarpates in tuberculosis might be of some value, I was led to try the effect of subcutaneous injections of hydnocarpates in chronic pulmonary tuberculosis. "Alepol", a Burroughs Wellcome and Company preparation, consisting of the sodium salts of the less irritating and lower melting point fatty acids



of the *Hydnocarpus wightiana* oil suitable for injection was used. A sterile 2% solution with 0.5% carbolic acid was prepared for use.

Six patients were selected. All had chronic bilateral disease, and one was complicated by laryngeal tuberculosis. Cases I and II were stationary and the remaining four active. All the patients had tubercle bacilli in their sputa, although in Case II the sputum had become free from bacilli prior to the investigation. Brief notes of these cases are to be found in the appendix.

#### Dosage.

Bearing in mind the fact that hydnocarpates have been known to produce undesirable reactions in cases of leprosy complicated by pulmonary tuberculosis, I decided to proceed carefully, begin with very small doses, and to increase these according to any reactions that might be produced. The initial dose was 0.1 cubic centimetre of the prepared solution. This was equivalent to 0.002 gramme of "Alepol". The maximum dose given was 1.5 cubic centimetres (0.03 gramme). Doses were given at intervals of several days, the intervals

centimetres of 3% solution are advised biweekly after tolerance has been determined.

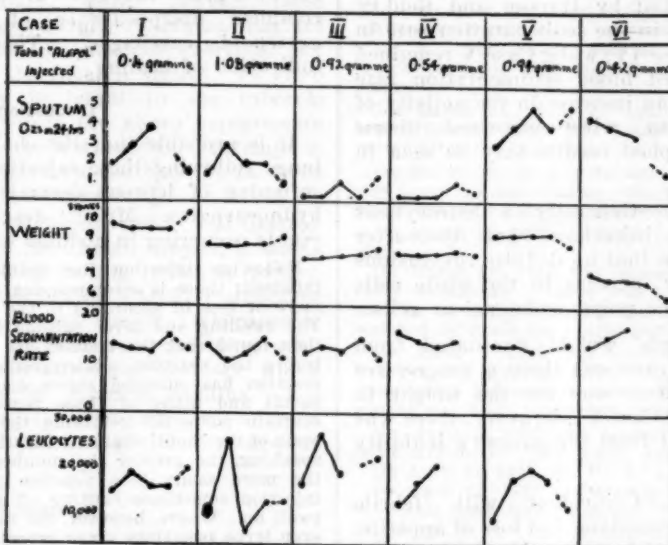
#### Effects Noted.

The effects noted may be described under several headings.

**Temperature.**—In each case rise of temperature occurred within twenty-four to forty-eight hours of the injection. The reactions were sometimes irregular in occurrence. The temperature tended to stay up for several days and not to subside readily. In Case V, after an injection of 1.5 cubic centimetres, the temperature remained elevated for eight consecutive days, ranging between 99.8° and 101.6° F. Reactions were produced in all cases and with the smallest doses. The effect on the two chronic apyrexial cases was to produce oscillations of two degrees or more per

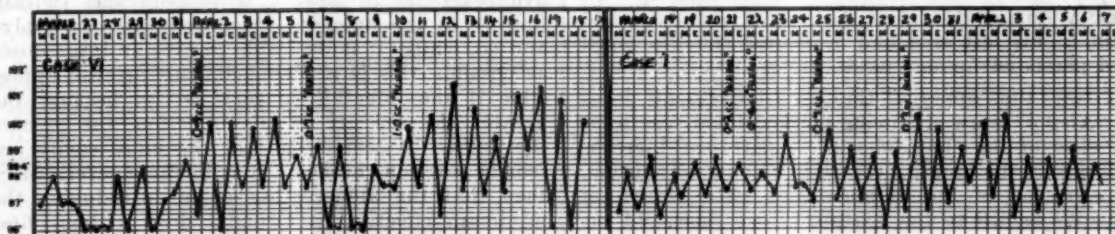
diem as well as occasional elevations above normal. Portions of the temperature charts in Cases I and V are shown and indicate the type of febrile reactions obtained (see Chart II).

**Sputum.**—Periodic weighings of the sputum showed a marked increase in quantity in all except



GRAPH I.

A composite graph shows the effects of injections on the sputum, weight, blood sedimentation rate and leucocyte count. The last reading in each case is taken three to four months after the cessation of treatment. The total amount of "Alepol" in grammes given to each patient is also indicated.



GRAPH II.

Portion of the temperature charts of two patients, showing the type of reaction obtained to the injections of "Alepol".

being regulated by the reactions produced, time being allowed for these to subside before another injection was given. No local reactions were noted at any time. The total amount of "Alepol" injected into each patient is shown in Chart I. Treatment was carried out for an average period of over two months.

It may be mentioned here that in giving "Alepol" in cases of leprosy much larger doses of five cubic

Case VI. This exception might be explained by the fact that the severity of the laryngeal infection prevented expectoration. Records of sputum weighings are shown in Chart I. In Case I, after a severe reaction, the sputum became blood-stained, while tubercle bacilli reappeared in the sputum in Case II. There was no evidence of alteration in beading or granulation of the tubercle bacilli. No aberrant forms were noted and there was no

appreciable diminution in the number of bacilli in specimens of each case. No loss of acid-fastness of the tubercle bacilli was noted, though this was carefully looked for.

**Blood Sedimentation Rate.**—The blood sedimentation rate estimations were carried out according to the method described by Harvey and Reid.<sup>(6)</sup> There was an increase in the sedimentation rate in four cases, a fall in Case IV, while Case V remained stationary. The raised blood sedimentation rate was taken to indicate an increase in the activity of the pulmonary lesion with increased tissue destruction. The graphed results may be seen in Chart I.

**Blood Examination.**—Generally a leucocytosis followed the initial injections, but thereafter counts were so variable that no definite conclusions could be drawn. Any increase in the white cells was chiefly amongst the polymorphonuclear cells.

**Weight.**—The patients' weight fluctuated from week to week. In no case was there a progressive gain. The general effect was for the weight to remain stationary. In Case VI, however, there was a steady loss of weight from the patient's inability to take food.

**General Condition.**—Coincident with febrile reactions the patients complained of loss of appetite, headache, feeling feverish, miserable and out of sorts. The two ambulatory patients were glad to return to bed. Cough was increased. Three patients complained that they felt worse since injections had started, and the psychological effect was bad.

**Physical Signs.**—In from one to two weeks after the commencement of injections there was a marked increase in the moist sounds heard on auscultation. This occurred in all cases and persisted till the injections were discontinued. Several weeks then elapsed before these moist sounds cleared up. In Case V during treatment the patient complained of pain in his left side and a pleural rub developed and persisted for one week.

It was thus apparent that even these small doses of "Alepol" were producing marked focal reactions. In view of the elevations of temperature, increase of signs in the lungs, increase in amount of sputum, acceleration of the sedimentation rate, return of tubercle bacilli to the sputum in one case, and the undesirable symptoms exhibited by the patients, it was deemed unwise to continue further with the injections. After the cessation of treatment there was a gradual subsidence of signs and symptoms. Three months later three of the patients had shown slight gradual improvement, but the rate could not be said to be accelerated by the course of injections. In Case V the patient has retrogressed, and patients IV and VI died, the former from hæmoptysis and the latter from asthenia due to his laryngeal disease. The injections do not appear to have had any late beneficial effect.

In the one case of laryngeal tuberculosis, intratracheal injections of "Alepol" daily for a period of several weeks were given. These did not relieve pain and were later combined with menthol and cocaine. Subcutaneous injections of "Alepol" were given at the same time. *Post mortem* examination revealed gross ulceration of the larynx, with almost complete disappearance of the epiglottis and arytenoid cartilages. There was no visible indication of healing.

#### Discussion.

It is probable that the changes occurring in the lungs following these injections are similar to the softening of leprosy dermal nodules produced by hydnocarpates. Muir<sup>(6)</sup> describes the sequence of events occurring in nodular leprosy thus:

Following injection the nodules become swollen and inflamed; there is accompanying fever, the patient feeling more or less ill according to the severity of the reaction. The swelling and fever subside in a few days and it is then found that the nodules are smaller than they were before the reaction. Microscopic examination after the reaction has subsided shows disappearance of the lepra bacilli and many of those remaining show granulation (certain parts not retaining their acid fastness), while some of the bacilli exhibit a diphtheroid form... Generally speaking, the greater the number of bacilli in the body, the more easily is a reaction produced, even a single injection sometimes causing all the cutaneous lesions to swell up. Where, however, the number of bacilli is small, even large injections given repeatedly may fail to produce any reaction.

Although it is difficult to be sure what the exact nature of the action of these drugs in leprosy is, the fact that after reactions the microscopic appearance of the bacilli is altered points to the hydnocarpates having a special affinity for the waxy envelope of the bacilli. With the removal of this protective covering the bacilli are destroyed or are rendered susceptible to the phylactic power of the body.

The bactericidal or rather beneficial effect of the hydnocarpates in leprosy is proportional (within limits) to the amount introduced into the body; and so, whilst it is desirable to give as large doses as possible, this is rendered difficult or even impossible if the infection is very severe, because the greater the severity of the injection, the greater the degree of sensitivity and the more easily are febrile reactions evoked. It is in these severe cases then that the difficulty arises of introducing the minimum effective bactericidal dose without first provoking dangerous reactions, which increase the activity of the leprosy nodules and even produce fresh nodules, and which apparently always precede the destruction of the Hansen's bacillus. What the exact nature of these reactions may be is doubtful. They may be a hypersensitive phenomenon, but, on the other hand, seem to vary according to the severity of the lesion. In some cases very small amounts of hydnocarpate are sufficient to produce them.

Returning to the effect of "Alepol" in pulmonary tuberculosis, it appears that we are confronted with

a set of conditions comparable to what obtains in a severe case of leprosy infection. Our injections have elicited reactions similar to those occurring in leprosy, and very small injections have been sufficient to produce focal effects, the pulmonary lesion showing definite lighting up with increase in the number of moist sounds. While, however, these injections have produced definite reactions, they are too small to exert, or incapable of exerting, any bactericidal effect on the tubercle bacilli. *In vitro* "Alepol" undoubtedly is lethal to the tubercle bacillus, but unfortunately the above experiments indicate the difficulty which arises when attempt is made to obtain this effect on the bacillus in cases of human pulmonary tuberculosis.

In seeking a chemical agent which will destroy the tubercle bacillus in the human subject, it seems that the greatest hope of finding it lies in experimenting with substances having a similar structure to the hydncarpates. Any chemical therapeutic agent must have the property of combining with and destroying the resistant waxy envelope which so effectively protects the tubercle bacillus. The fatty acid derivatives of hydncarpates or substances with similar carbon ring structure appear most likely to do this.

#### Summary.

1. Six selected patients with pulmonary tuberculosis were treated with carefully graduated doses of "Alepol", a substance containing the sodium salts of the fatty acids of *Hydncarpus wightiana* oil.

2. In none of these cases were immediate or late beneficial results obtained.

3. The effect of injections was to produce undesirable pulmonary reactions and a temporary setback to any improvement as was occurring under general hygienic measures.

4. Though only small doses were given, it was thought that the continuation of treatment would be detrimental to the patients concerned.

5. Topical applications of "Alepol" to tuberculous ulcerations of the larynx had no effect in relieving pain or checking ulceration.

6. The nature of the reactions produced is discussed.

#### Acknowledgement.

I wish to thank Dr. R. M. Mitchell for the assistance and encouragement he has given me in carrying out these experiments.

#### Appendix.

##### Case Reports.<sup>1</sup>

CASE I.—G.W., a male, aged twenty-five years, had an illness which was first diagnosed as pulmonary tuberculosis in 1927, when he was admitted to the sanatorium for five months. He was readmitted in April, 1931. The sputum contained tubercle bacilli and the X ray picture

revealed bilateral fibrosis and a cavity in the right upper lobe. The condition was improving slowly; there were occasional slight rises of temperature. On careful auscultation only a few râles and crepitations could be heard scattered over both lung fields.

On March 22, 1933, treatment was commenced by the injection of 0.4 cubic centimetre of "Alepol". On blood examination the hæmoglobin value was 90% (Sahli). The leucocytes numbered 14,750 per cubic millimetre. The white cells were present in normal proportion. The B.S.R. was 14. The weight was 61.7 kilograms (nine stone eleven pounds). The sputum weighed 60 grammes (two ounces).

On March 25, 1933, 0.7 cubic centimetre of "Alepol" was given. The patient complained of feeling "out of sorts" after the injection. He was allowed to stay in bed.

On March 26, 1933, a definite increase in moist sounds was heard on auscultation; the patient's weight was 61.25 kilograms (nine stone ten pounds).

On March 28, 1933, 0.7 cubic centimetre of "Alepol" was given.

On March 29, 1933, the leucocyte count was 18,500 per cubic millimetre. There was a relative increase in the number of polymorphonuclear leucocytes. The sputum weighed 90 grammes (three ounces).

On April 3, 1933, the sputum was blood-stained and weighed 120 grammes (four ounces). There was a very pronounced increase in moist sounds in the chest. The weight was 61.25 kilograms (nine stone ten pounds).

On April 8, 1933, the leucocyte count was 13,000 per cubic millimetre. The B.S.R. was 12.5.

On April 21, 1933, the B.S.R. was 16.

On April 12, 1933, the sputum was clear; the sounds in the chest were less numerous. The patient was allowed to get up.

Three months later the patient had shown slow, steady improvement. His weight was 64.8 kilograms (ten stone four pounds). The leucocyte count was 20,000 per cubic millimetre. The B.S.R. was 16. The sputum weighed 55.5 grammes (one and three-quarter ounces). A portion of the temperature chart of this patient showing febrile reactions is appended (see Chart II).

CASE II.—H.A., a male patient, aged thirty-three years, had shown slow gradual improvement since admission to the sanatorium sixteen months ago. He had bilateral pulmonary tuberculosis with fibrosis of both upper lobes and cavitation at the right apex. His was an ambulatory and apyrexial case. For the past six months tubercle bacilli had been absent from the sputum.

On March 18, 1933, treatment was commenced with an injection of 0.1 cubic centimetre of "Alepol". The hæmoglobin value was 95% (Sahli). The leucocyte count was 11,000 per cubic millimetre. The white cells were present in approximately normal proportions. The B.S.R. was 14. The patient's weight was 55.4 kilograms (eight stone eleven pounds). The sputum weighed 45 grammes (one and a half ounces).

On March 19, 1933, 0.2 cubic centimetre of "Alepol" was given.

On March 20, 1933, 0.4 cubic centimetre of "Alepol" was given.

On March 22, 1933, 0.7 cubic centimetre of "Alepol" was given.

On March 25, 1933, 1.0 cubic centimetre of "Alepol" was given. The patient's weight was 55.4 kilograms (eight stone eleven pounds).

On March 28, 1933, 1.5 cubic centimetres of "Alepol" were given. The leucocyte count was 26,000 per cubic millimetre. The B.S.R. was 10.

On March 29, 1933, the patient complained of headache and "feeling queer" after the last injection, and sputum weighed 90 grammes (three ounces).

On April 8, 1933, tubercle bacilli were present in the sputum. The patient's weight was 55.8 kilograms (eight stone twelve pounds). The B.S.R. was 11.5.

On April 11, 1933, 1.5 cubic centimetres of "Alepol" were given. The sputum weighed 60 grammes (two ounces).

<sup>1</sup> In these reports the abbreviation "B.S.R." is used for "blood sedimentation rate". The weight of sputum denotes the amount of expectoration in twenty-four hours.



On April 21, 1933, the B.S.R. was 15. The patient's weight was 56.25 kilograms (eight stone thirteen pounds). The sputum weighed 60 grammes (two ounces).

Four months later the patient felt very well and was actively engaged in secretarial work. His weight was 58 kilograms (nine stone three pounds). The sputum weighed 30 grammes (one ounce). The leucocyte count was 13,000 per cubic millimetre. The B.S.R. was 10.

**CASE III.—D.C.**, a male patient, aged twenty-five years, was admitted to the sanatorium on March 11, 1933. The father and one sister had died of pulmonary tuberculosis. The patient had bilateral invasion with active consolidation and cavitation in the upper lobe of the left lung. Since admission the patient's temperature had settled satisfactorily and the general condition had improved. The patient was in bed.

On March 18, 1933, treatment was commenced with 0.1 cubic centimetre of "Alepol" given subcutaneously. The hæmoglobin value was 80% (Sahli). The leucocyte count was 17,000 per cubic millimetre. The white cells were present in normal proportions. The B.S.R. was 12. The patient's weight was 50.4 kilograms (eight stone). The sputum weighed 7.5 grammes (one-quarter of an ounce).

On March 20, 1933, 0.2 cubic centimetre of "Alepol" was given. The patient's weight was 51.3 kilograms (eight stone two pounds).

On March 22, 1933, 0.4 cubic centimetre of "Alepol" was given. The temperature rose to 101.4° F. The sputum weighed 7.5 grammes (one-quarter of an ounce).

On March 25, 1933, 0.6 cubic centimetre of "Alepol" was given.

On March 28, 1933, 0.8 cubic centimetre of "Alepol" was given. The patient's weight was 51.75 kilograms (eight stone three pounds).

On March 29, 1933, there was an increase in moist sounds in both lungs. The leucocyte count was 27,300 per cubic millimetre. The B.S.R. was 14.

On April 6, 1933, 1.0 cubic centimetre of "Alepol" was given. The leucocyte count was 19,000 per cubic millimetre. The B.S.R. was 13. Râles were less numerous. The sputum weighed 30 grammes (one ounce) (increase).

On April 11, 1933, 1.5 cubic centimetres of "Alepol" were given. The patient's weight was 53.1 kilograms (eight stone six pounds).

On April 13, 1933, the sputum weighed 7.5 grammes (one-quarter of an ounce).

On April 17, 1933, the temperature was normal, having been elevated since the last injection. The B.S.R. was 15.

Four months later the temperature chart was normal. The leucocyte count was 22,000 per cubic millimetre. The B.S.R. was 10. The patient had shown slight gradual improvement. His weight was 53.55 kilograms (eight stone seven pounds). The sputum weighed 37.5 grammes (one and a quarter ounces).

**CASE IV.—F.J.R.**, a male patient, aged twenty-one years, was admitted to the sanatorium on March 4, 1933. This patient had active bilateral pulmonary tuberculosis with consolidation in both upper lobes. The temperature had not subsided even with complete rest in bed, and the patient's condition had not improved.

On March 21, 1933, treatment was commenced with 0.2 cubic centimetre of "Alepol" given subcutaneously. The hæmoglobin value was 90% (Sahli). The leucocyte count was 12,500 per cubic millimetre. The B.S.R. was 17.5. The patient's weight was 52.65 kilograms (eight stone five pounds). The sputum weighed 7.5 grammes (one-quarter of an ounce).

On March 23, 1933, 0.4 cubic centimetre of "Alepol" was given.

On March 25, 1933, 0.4 cubic centimetre of "Alepol" was given. The patient's weight was 53.1 kilograms (eight stone six pounds).

On March 28, 1933, 0.7 cubic centimetre of "Alepol" was given.

On March 31, 1933, the patient had had a severe reaction following the last injection. The leucocyte count was 16,000 per cubic millimetre. The B.S.R. was 15. The sputum weighed 7.5 grammes (one-quarter of an ounce).

On April 7, 1933, the leucocyte count was 20,000 per cubic millimetre. The B.S.R. was 14. The patient's weight was 52.65 kilograms (eight stone five pounds). The sputum weighed 7.5 grammes (one-quarter of an ounce).

On April 9, 1933, 1.0 cubic centimetre of "Alepol" was given. The patient's weight was 53.1 kilograms (eight stone six pounds). The sputum weighed 30 grammes (one ounce). The reactions produced in this patient were very severe, the temperature rising to 101° and 102° F. A month later the patient left the sanatorium at his own risk and a few weeks later died suddenly from hæmoptysis. At the time of his discharge his weight was 52.2 kilograms (eight stone four pounds). The sputum weighed 15 grammes (half an ounce).

**CASE V.—I.P.**, a male patient, aged thirty-three years, a native of Jugo-Slavia, who had been six years in Australia, was admitted to the sanatorium on March 4, 1933, with advanced bilateral pulmonary tuberculosis with cavitation. The temperature had not subsided with rest in bed.

On March 18, 1933, treatment was commenced with 0.1 cubic centimetre of "Alepol" given subcutaneously. The hæmoglobin value was 75% (Sahli). The leucocyte count was 8,500 per cubic millimetre. The B.S.R. was 14. The patient's weight was 58 kilograms (nine stone three pounds). The sputum weighed 90 grammes (three ounces).

On March 20, 1933, 0.2 cubic centimetre of "Alepol" was given. The temperature rose to 102.2° F. after the injection.

On March 23, 1933, 0.3 cubic centimetre of "Alepol" was given. The leucocyte count was 19,000 per cubic millimetre. The polymorphonuclear cells were in excess.

On March 25, 1933, 0.6 cubic centimetre of "Alepol" was given. The patient's weight was 58.95 kilograms (nine stone five pounds).

On March 27, 1933, the leucocyte count was 20,000 per cubic millimetre. The B.S.R. was 14.

On March 28, 1933, 1.0 cubic centimetre of "Alepol" was given. After the injection the patient complained of pain in both sides of the chest.

On March 30, 1933, there was an increase in the number of moist sounds in both lungs. A friction rub was present in the left axillary region. The sputum weighed 120 grammes (four ounces).

On April 2, 1933, the patient's weight was 59.4 kilograms (nine stone six pounds).

On April 6, 1933, 1.0 cubic centimetre of "Alepol" was given subcutaneously. The moist sounds were still abundant, but the friction rub had disappeared. The leucocyte count was 19,500 per cubic millimetre. The B.S.R. was 12.5. The sputum weighed 150 grammes (five ounces).

On April 11, 1933, 1.5 cubic centimetres of "Alepol" were given. The temperature rose to 102° F. on the afternoon of the injection and remained elevated for eight consecutive days. The patient's weight was 60 kilograms (nine stone seven pounds). The sputum weighed 120 grammes (four ounces). Three months later the patient was still running a hectic temperature and his condition was slowly retrogressing. The leucocyte count was 9,500 per cubic millimetre. The B.S.R. was 13. His weight was 55.25 kilograms (eight stone thirteen pounds). The sputum weighed 150 grammes (five ounces).

**CASE VI.—A.C.L.S.**, a male patient, aged forty years, was admitted to the sanatorium on March 25, 1933. He had bilateral pulmonary tuberculosis with laryngeal tuberculosis. Owing to persistent dysphagia the patient could take only very little food and was rapidly losing weight. Slight relief from the pain in the throat was obtained from chloretone inhalation, menthol and cocaine sprays and orthoform insufflation. The B.S.R. was 12. The patient's weight was 42.7 kilograms (six stone eleven pounds). The sputum weighed 135 grammes (four and a half ounces).

On March 29, 1933, the larynx was sprayed with 2% "Alepol" solution, an intratracheal syringe being used. This was to be repeated twice a day.

On April 1, 1933, 0.4 cubic centimetre of "Alepol" was given subcutaneously. The patient's weight was 41 kilograms (six stone seven pounds).

On April 6, 1933, 0.7 cubic centimetre of "Alepol" was given. The sputum weighed 120 grammes (four ounces).

On April 10, 1933, the 2% "Alepol" laryngeal spray had not given any relief from pain, the cough had become quite ineffectual and ulceration was progressing. To obtain relief from pain the laryngeal solution was combined with cocaine 10% and later with menthol. One cubic centimetre of "Alepol" was given subcutaneously. The patient's weight was 41 kilograms (six stone seven pounds).

On April 14, 1933, the sputum weighed 105 grammes (three and a half ounces).

On April 18, 1933, the temperature was still elevated since the last injection. The patient was to have nutrient enemata every forty-eight hours.

On April 24, 1933, the patient was much weaker. Laryngeal spraying was discontinued. The sputum weighed 37.5 grammes (one and a quarter ounces). The patient's weight was 37.8 kilograms (six stone).

On May 1, 1933, the patient died.

#### References.

<sup>(1)</sup> S. L. Cummins and C. Weatherall: "A Note on the Inhibitory Action of 'Alepol' on the Growth of Tubercle Bacilli in Beardedka's Fluid Egg Medium", *The British Medical Journal*, January 14, 1933, page 48.

<sup>(2)</sup> Leonard Rogers: "Observations on the Use of Hydrocarpat and Morrhuaes Intradermally in Lupus Vulgaris", *The British Medical Journal*, January 14, 1933, page 47.

<sup>(3)</sup> Annual Report of Robroydon Hospital, Glasgow. Reprint from the Medical Officer's Annual Report for 1926, page 5.

<sup>(4)</sup> Leonard Rogers: "Observations on the Use of Hydrocarpat and Morrhuaes Intradermally in Lupus Vulgaris", *The British Medical Journal*, January 14, 1933, page 47.

<sup>(5)</sup> Cotter Harvey and M. Reid: "Erythrocyte Sedimentation Rate in Pulmonary Tuberculosis and Other Pulmonary Diseases", *THE MEDICAL JOURNAL OF AUSTRALIA*, October 1, 1932, page 405.

<sup>(6)</sup> E. Muir: "Handbook on Leprosy", printed at the Orissa Mission Press, Cuttack, 1921.

#### VITAMIN C.

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THE armies of the crusaders suffered from dietary diseases, and all the early sea voyages constitute records of a dread disease that took a large toll of the crew of any ship which essayed a long voyage. The disease was scurvy, and its origin and cure were unknown until one James Lind, a surgeon, in 1847 conducted experiments which pointed to the use of orange or lemon juice in combating it. Since that time the incidence of scurvy has been correlated with the absence of vitamin C in the diet, and numerous experiments have been carried out with a view to the estimation of the antiscorbutic activity of various foodstuffs. Little information had been acquired up to the last two years as to the intrinsic nature of the vitamin, with the exception of Bessonov's investigations in 1924,<sup>(1)</sup> in which he stated that phospho-tungstic-phosphomolybdate gave a blue colour with vitamin C and also with indophenols. From this time onwards until 1932 there was very little increase in our knowledge of the chemical nature of vitamin C.

In 1927 and 1928 the first experiments were made by Professor Szent-Gyorgyi,<sup>(27)</sup> Director of the

Institute of Medical Chemistry at Segred in Hungary, which laid the foundation for later important advances.

Szent-Gyorgyi was investigating oxidation reduction mechanisms in various plant and animal tissues, and found in the cortex of the adrenal gland a substance which was able to reduce silver nitrate unaided, so that in pieces of gland placed in a 1% or 2% solution of silver nitrate, the cortex rapidly turned an intense black; the medulla of the gland did not give this reaction. Szent-Gyorgyi obtained crystalline extracts of this reducing substance from both the gland and certain plant tissues, and it was believed, after a series of analyses and due consideration of its properties, to be an acid of the hexuronic series. This compound possessed the property of being easily oxidized and reduced. Tillmans later suggested that there appeared to be a definite relationship between the distribution of hexuronic acid in various animal tissues and that of vitamin C.

This led Svrbely and Szent-Gyorgyi<sup>(32)</sup> into a series of experiments on the possible relationship between vitamin C and hexuronic acid, in which they fed guinea-pigs on a vitamin C-free diet and gave them small doses of hexuronic acid daily to replace the lack of vitamin. The guinea-pigs failed to develop scurvy, even after a ninety-day test period.

When these experiments were published, King and Waugh announced in *Science*<sup>(30)</sup> and in the *Journal of Biological Chemistry*<sup>(37)</sup> the results of experiments in which they stated that they had obtained from lemon juice crystals of a substance that showed antiscorbutic activity and was similar to hexuronic acid in its chemical and physical properties. This led other workers to undertake the testing of the relationship between vitamin C and hexuronic acid.

The possibility was ever present in this work that some impurity in the hexuronic acid was responsible for the antiscorbutic activity. This was rendered more likely from the fact that the minimal dose per day to prevent the appearance of scurvy in guinea-pigs was 0.5 to 1.0 milligramme of hexuronic acid, a relatively large amount.

L. V. Vargha<sup>(36)</sup> obtained specimens of monoacetone hexuronic acid by shaking the acid with acetone in the presence of anhydrous copper sulphate for twenty-four hours. The monoacetone derivative was obtained in the form of colourless prisms or long needles. It was found that this compound is readily decomposed into acetone and hexuronic acid by the action of water.

Svrbely and Szent-Gyorgyi,<sup>(33)</sup> by preparing the monoacetone derivative of the acid and then reobtaining the free acid by the action of water, reduced the possibility of contamination to a minimum. Hexuronic acid purified in this fashion was still found to have a considerable antiscorbutic action.

In the meantime experiments were being carried on in an endeavour to obtain the chemical formula, additional chemical and physical properties *et cetera* of the acid.

Cox and others<sup>(12)</sup> published in *Nature* an account of the reactions of hexuronic acid, such as the taking up of iodine in aqueous solution, the production of furfural when heated with hydrochloric acid *et cetera*. They stated that the biological activity of the acid was probably due to the readiness with which it might be oxidized or reduced, being in this respect similar to glutathione. Szent-Gyorgyi states that it gives off and takes up two atoms of hydrogen, thus acting as a hydrogen-carrier between different parts of its oxidation system. The former workers also found that the sodium or calcium salt of the acid turned a bright blue with sodium nitroprusside.

Cox<sup>(11)</sup> examined the crystalline structure of hexuronic acid and found the crystals to be monoclinic and sphenoidal, while Herbert and Hirst,<sup>(19)</sup> studying the absorption spectrum of the acid, discovered that the absorption resembled that of many ketonic substances.

L. J. Harris and S. Zilva<sup>(40)</sup> in England independently tested Szent-Gyorgyi's work on the prevention of scurvy in guinea-pigs with hexuronic acid and obtained confirmatory results.

Harris and other workers<sup>(16)</sup> at Cambridge elaborated a method for estimating minute quantities of hexuronic acid, using phenol 2.6-dichlorindophenol, and with the aid of this method have carried out a very extensive series of experiments ranging over a number of plant and animal tissues. They found a correlation between anti-scorbutic content and hexuronic acid content.

In view of the presence of the acid in some considerable quantity in the cortex of the adrenal gland, Moore and Ray<sup>(24)</sup> at Cambridge carried out a number of staining reactions on adrenal glands, using silver nitrate on macroscopic slices of the glands. They found that normal guinea-pig adrenals were blackened very deeply after fifteen minutes in a 0.4% solution of silver nitrate, but that the adrenals of guinea-pigs afflicted with scurvy remained "completely unaffected". The authors describe their result as dramatic. They were not able to find any distinction between cortex and medulla in guinea-pig adrenals, such as Szent-Gyorgyi<sup>(27)</sup> found in ox adrenals.

The present author has found that in the guinea-pig adrenal the cortex blackens first and the medulla shows a certain latency in its time of blackening. Rat adrenals were found by Moore and Ray to retain their silver nitrate-reducing properties even after the animals had been for some time on a scurvy-producing diet, and they show that this result is in keeping with the view that rats are able to synthesize their own vitamin C.

Further investigations on the chemical nature of vitamin C by Haworth and Szent-Gyorgyi,<sup>(26)</sup> made possible by the latter's discovery that the Hungarian

red pepper (paprika) contained large amounts of easily extractable acid and therefore enabled relatively large quantities to be obtained for analytical purposes, led the authors to announce that, since the acid contained two molecules of water less than the true hexuronic acids, it was therefore to be called "ascorbic acid".

A number of workers had been attempting to obtain the chemical formula of the acid, and Hirst and others<sup>(18)</sup> confirmed the empirical formula  $\text{COOH} \cdot \text{CO} \cdot \text{CO} \cdot \text{CHOH} \cdot \text{CHOH} \cdot \text{CH}_2\text{OH}$ . Karrer (quoted in "Science Progress") and Kraft and Micheel<sup>(21)</sup> also suggested formulae.

Birch and Dann<sup>(5)</sup> estimated the distribution of ascorbic acid and glutathione in tissues and organs and found that up to 40% of the iodine reduction was due to the presence of ascorbic acid in these tissues. They found that tissues which were rich in glutathione were also found to be rich in vitamin C (ascorbic acid), and the authors suggest that glutathione and the vitamin may be two linked factors in a "redox" system, and announce that they have already obtained a thermolabile agent which catalyses the oxidation (dehydrogenation) of ascorbic acid. The authors give a table of ascorbic acid and glutathione content of tissues. The ascorbic acid values are reproduced.

Tissue.	Ascorbic Acid (milligrammes per gramme).
Rat blood .. .. .	less than 0.02
Rat muscle .. .. .	0.06
Rat liver .. .. .	0.15
Rat kidney .. .. .	0.22
Sheep liver .. .. .	0.45
Sheep eye lens .. .. .	0.46
Rabbit liver .. .. .	0.40
Rabbit kidney .. .. .	0.25
Guinea-pig liver (scurbutic) .. .. .	0.09
Guinea-pig liver (normal) .. .. .	0.30
Ox adrenal cortex .. .. .	1.62

Thus it may be seen that the adrenal gland contains by far the greatest amount of ascorbic acid per gramme of tissue, and it is in fact the most potent source known, containing three times the quantity found in a comparable amount of orange juice.

Svirbely<sup>(34)</sup> has also examined the ascorbic acid content of liver and adrenal gland and finds that in mild scurvy the liver loses its vitamin C first, thus indicating that it functions as a storehouse for the reserve vitamin.

Zilva and Gough,<sup>(41)</sup> in a recent paper in *The Biochemical Journal*, showed that the adrenals of different animals and also of human beings varied in their silver staining capacity, and that sometimes the medulla stained more deeply than the cortex. They also found that the pituitary gland and also the ovary contained supplies of the argentophile material, the pituitary staining particularly deeply. The present author and H. G. Breidahl have shown that in guinea-pigs on a scurbutic diet the adrenal glands lose their argentophilia, while the scurvy is still comparatively mild, while the pituitary still



stains as intensely as ever. Zilva and Gough, however, state in their paper that in a guinea-pig on a scorbutic diet and decitrated lemon juice the adrenal still fails to stain with silver nitrate, although the pituitary does so.

In the meantime, Birch, Harris and Ray and Dann<sup>(4)</sup> had practically confirmed and published evidence in favour of the identity of vitamin C with ascorbic acid. The eight points which they quoted as evidence are given briefly below.

1. The antiscorbutic value of a number of natural products was comparable to the amount of contained ascorbic acid.
2. Ascorbic acid obtained from paprika and that obtained from adrenal cortex were found to have identical antiscorbutic properties.
3. Despite repeated purification, the ascorbic acid retained its antiscorbutic properties.
4. The estimated ascorbic values of a number of natural products accounted for their antiscorbutic activity.
5. The estimation of ascorbic acid by intensity of absorption was correlated with the biological and chemical tests.
6. In the guinea-pig in scurvy the antiscorbutic value of liver and kidney was lost. This corresponds with the disappearance of ascorbic acid.
7. The thermostability of ascorbic acid and vitamin C activity were similar.
8. With other species which are able to synthesize their own vitamin C (rat and dog) ascorbic acid content and antiscorbutic property remained the same on a scorbutic diet.

The present author published in *Nature*<sup>(6)</sup> in July of this year an account of the histological examination of vitamin C in the adrenal glands of a number of mammals and found that there was a tendency for the nuclei of the cells to become surrounded by granules of the vitamin. In some cases this aggregation was so great that the nuclei became obscured. Vitamin C granules were also found aggregated at the periphery of some of the cells and also around the lipid globules in certain of the adrenal cortical cells. Both the cortical and medullary cells were found to give the granule reaction. Further details of the technique *et cetera* are in the press<sup>(7)</sup> and the subsequent application of a modification of the technique to the adrenal gland of a fifty-five centimetre human foetus showed the vitamin C granules to be closely aggregated round the nuclei of the cells, this aggregation being particularly well marked in the region of the foetal cortex. This work, together with a discussion of the possible physical state of the vitamin in the gland cell has formed the basis of a communication which has recently been published in *Nature*.<sup>(8)</sup> In view of the fact that certain American workers have postulated the presence of a second hormone of the adrenal cortex distinct from the cortin, namely, cortilactin, without the intervention of which a pregnant female is unable to secrete milk, a number of male and female rabbits (the females in varying stages of pregnancy) were examined for the state of the vitamin in their adrenals. So far it appears that there is a progressively more dense aggregation of the vitamin around the nuclei of the cells as the pregnancy advances. It seems highly probable that the presence of vitamin C in such high concentra-

tion in the adrenal gland is intimately associated with the hormonal activity of the gland. The variation of the vitamin in different physiological conditions may shed a little more light on the subject. The author<sup>(9)</sup> has found that in the adrenal glands of a certain marsupial which had escaped from captivity and which was captured and killed only after some considerable time and great difficulty, the vitamin C reaction of the cortex was much less and the vitamin was aggregated chiefly in the medulla. This result is of considerable significance in view of the opinion which is beginning to be held, that vitamin C is intimately associated with the production of adrenaline.

Further support of this hypothesis is given by work in collaboration with H. G. Breidahl, described in the author's paper,<sup>(9)</sup> namely, the medulla exhibits a higher concentration of vitamin C than the cortex following chloroform anaesthesia (rabbits), after injection of adrenaline (guinea-pigs and cats), after injection of foreign proteins (guinea-pigs). That is, if the adrenal medulla is forced to give a defence reaction, then the vitamin C appears subsequently to be more densely aggregated in that region of the gland. It appears, therefore, that vitamin C either functions in the synthesis of adrenaline and/or prevents it from being oxidized to adrenaline after it is formed, as Harris, of Cambridge, has suggested.

When it is realized that adrenaline is injected to relieve attacks of asthma, the importance of this relationship between hormone and vitamin becomes immediately apparent.

In a recent issue of *The Proceedings of the Royal Society of Medicine* it was shown that persons suffering from asthma possessed a definite deficiency of adrenaline, and it is postulated that it is this innate adrenaline deficiency which renders them susceptible to attacks of asthma. We may couple with this work the statement of McCollum,<sup>(22)</sup> in which he declares that in scurvy also there is a decrease in the amount of adrenaline liberated into the blood.

In view of the fact that guinea-pig anaphylaxis is similar to an asthma attack, Breidahl and the author placed guinea-pigs on a scorbutic diet, sensitizing them a few days afterwards, and at the end of a fortnight on the diet gave them a second injection, which was expected to send the animals into a violent anaphylactic fit. The reaction, however, was quite mild. *Post mortem* vitamin C tests were made after the animals were killed at the conclusion of the experiment; and while it was found that the adrenals showed typical scorbutic hypertrophy and argentophobia, the pituitary gland was found to give as intense a reaction as ever. It was possible that something produced by the vitamin C of the pituitary was compensating for the reduced amount of adrenaline in circulation; and the fact that pituitary extracts have been found to give relief from asthma attacks, in some cases where adrenaline has failed, makes the result of the experiment more significant.

From these facts it appears that vitamin C may play an important part in the genesis of allergic complaints.

Harris<sup>(18)</sup> announced in a fairly recent communication to *Nature* that the aqueous humour of the eye contains a high percentage of vitamin C. H. K. Muller,<sup>(24)</sup> in a more recent communication, announced that he had been conducting a series of experiments on the reducing properties of the aqueous humour and had obtained some very significant results. He believes that there is a very intimate relationship between the metabolism of the lens and the vitamin C content of the aqueous humour, and that the vitamin C may be related to the genesis of cataract. He finds that if a lens is removed from the eye of a rabbit, the vitamin C practically disappears from the aqueous humour, and after oral administration of sufficient quantities of naphthalene to cause cataract within an experimental animal in four hours the reducing capacity of the aqueous humour disappears, and also in cattle afflicted with cataract there is a large reduction in the vitamin C content of the aqueous humour.

It appears that the transparency of the lens may be due to certain chemical substances of the tissue being held in a state of reduction by the vitamin, and on interference with this system the lens material becomes oxidized with concomitant opacity. In this respect it may be of significance that cataracts are often ripened by puncturing the aqueous humour. It is also of interest that Wald<sup>(25)</sup> has found extracts of the retina and chorioid to contain fairly high concentrations of vitamin A.

Boyland,<sup>(10)</sup> using Harris's method for the estimation of vitamin C, found that tumours contain relatively large amounts of a hitherto unsuspected strongly reducing substance, and Harris<sup>(18)</sup> has confirmed this result on the Jensen rat sarcoma. The biological results so far are shown to be inconclusive. Harris has subsequently found that a large part of this reducing substance is not vitamin C, but a hitherto unknown substance occurring in tumours.

The next step in our knowledge of vitamin C has been taken by Reichstein, Grussner and Oppenauer,<sup>(26)</sup> who, by treatment of l-xylosone, have been able to synthesize an l-ascorbic acid which they consider identical with natural ascorbic acid.

Eekelen and others<sup>(13)</sup> have brought forward evidence to the effect that the "reducing substance" in urine is vitamin C (they make no mention of other well known reducing substances in urine) and that the amount is increased to a greater extent in people who eat fresh fruit and vegetables than in those who eat larger amounts of cereals. They believe also that an oxidized substance in the blood which is reduced by hydrogen sulphide may also be identical with vitamin C, and people who eat greater amounts of fresh fruit and vegetables also show an increase in this substance. They also showed that the cerebro-spinal fluid contains a reducing substance with a similar spectrographic absorption to ascorbic acid.

Truly the change in our knowledge of vitamin C has been dramatic. Within two years we have changed from comparative ignorance to the synthesis of the vitamin. May we now hope with Szent-Gyorgyi<sup>(30)</sup> that the presence of vitamin C in the adrenal cortex in such large amounts may help us to a fuller understanding of the "relations between hormones and vitamins".

#### Acknowledgement.

I am indebted to Dr. H. G. D. Bredahl, honorary physician to the Perth Hospital Asthma Clinic, for acting as my collaborator in the work on asthma and for kindly providing a fresh human foetus for some of my other investigations.

#### References.

- <sup>(1)</sup> A. Bessonov: "Necessary Conditions for Testing with the Reagent for Vitamin C", *Biochemical Journal*, Volume XVIII, 1924, page 384.
- <sup>(2)</sup> T. W. Birch, L. J. Harris and S. N. Ray: "A Microchemical Method for the Determination of the (Vitamin C) Hexuronic Acid Content of Foodstuffs", *Biochemical Journal*, Volume XXVII, 1933, page 590.
- <sup>(3)</sup> T. W. Birch and L. J. Harris: "The Titration Curve and Dissociation Constants of Vitamin C", *Biochemical Journal*, Volume XXVII, 1933, page 595.
- <sup>(4)</sup> T. W. Birch, L. J. Harris and S. N. Ray: "Hexuronic Acid as the Antiscorbutic Factor and its Chemical Determination", *Nature*, Volume CXXXI, February, 1933, page 273.
- <sup>(5)</sup> T. W. Birch and Dann: "Estimation and Distribution of Ascorbic Acid (Vitamin C) and Glutathione in Foodstuffs", *Nature*, Volume CXXXI, March, 1933, page 469.
- <sup>(6)</sup> G. Bourne: "Vitamin C in the Adrenal Gland", *Nature*, Volume CXXXI, June, 1933, page 874.
- <sup>(7)</sup> G. Bourne: "The Staining of Vitamin C in Adrenal Gland", *Australian Journal of Experimental Biology and Medical Science* (in press).
- <sup>(8)</sup> G. Bourne: "Vitamin C in the Human Fetal Adrenal", *Nature*, Volume CXXXII, December, 1933, page 850.
- <sup>(9)</sup> G. Bourne: "The Physiological Significance of Vitamin C in the Adrenal Gland as Suggested by Cytology" (submitted for publication).
- <sup>(10)</sup> E. Boyland: "A Note on Glutathione and Vitamin C in Tumour Tissue", *Biochemical Journal*, Volume XXVII, 1933, page 802.
- <sup>(11)</sup> E. G. Cox: "Crystalline Structure of Hexuronic Acid", *Nature*, Volume CXXX, 1932, page 205.
- <sup>(12)</sup> E. G. Cox et alii: "Hexuronic Acid as the Antiscorbutic Factor", *Nature*, Volume CXXX, December, 1932, page 888.
- <sup>(13)</sup> M. van Eekelen et alii: "Vitamin C in Blood and Urine", *Nature*, Volume CXXXII, August, 1933, page 315.
- <sup>(14)</sup> L. J. Harris and S. N. Ray: "Vitamin C and the Suprarenal Cortex", *Biochemical Journal*, Volume XXVI, 1933, page 2067.
- <sup>(15)</sup> L. J. Harris: "A Chemical Test for Vitamin C and the Reducing Substances Present in Tumour and other Tissue", *Nature*, Volume CXXXII, July, 1933, page 27.
- <sup>(16)</sup> L. J. Harris and S. N. Ray: "Vitamin C and the Suprarenal Cortex", *Biochemical Journal*, Volume XXVII, 1933, page 303.
- <sup>(17)</sup> L. J. Harris and S. N. Ray: "Specificity of Hexuronic Acid as the Antiscorbutic Factor", *Biochemical Journal*, Volume XXVII, 1933, page 580.
- <sup>(18)</sup> E. L. Hirst et alii: "Constitution of Ascorbic Acid", *Nature*, Volume CXXXI, April, 1933, page 617.
- <sup>(19)</sup> R. W. Herbert and E. L. Hirst: "The Absorption Spectrum of Hexuronic Acid", *Nature*, Volume CXXX, August, 1932, page 205.
- <sup>(20)</sup> C. G. King and W. A. Waugh: "Chemical Nature of Vitamin C", *Science*, Volume LXXV, April, 1932, page 357.
- <sup>(21)</sup> E. Kraft and K. Mitchell: "Constitution of Vitamin C", *Nature*, Volume CXXXI, February, 1933, page 274.
- <sup>(22)</sup> E. V. McCollum and N. Simmonds: "The Newer Knowledge of Nutrition", 1929.
- <sup>(23)</sup> T. Moore and S. N. Ray: "Vitamin C and Hexuronic Acid", *Nature*, Volume CXXX, December, 1932, page 997.
- <sup>(24)</sup> H. K. Muller: "Reducing Property of Aqueous Humour", *Nature*, Volume CXXXII, August, 1933, page 280.
- <sup>(25)</sup> R. Oppenauer et alii: "Synthesis of d and l Ascorbic Acid (Vitamin C)", *Nature*, Volume CXXXII, 1933, page 280.
- <sup>(26)</sup> "Science Progress", Biochemistry Section, July, 1933, page 115.
- <sup>(27)</sup> A. Szent-Gyorgyi: "Observations on the Function of Peroxidase Systems and the Chemistry of the Adrenal Cortex", *Biochemical Journal*, Volume XXII, 1928, page 137.
- <sup>(28)</sup> A. Szent-Gyorgyi: *Nature*, Volume CXXXIX, June, 1932, page 943.
- <sup>(29)</sup> A. Szent-Gyorgyi and W. N. Haworth: "Hexuronic Acid (Ascorbic Acid) as the Antiscorbutic Factor", *Nature*, Volume CXXXI, January, 1933, page 24.
- <sup>(30)</sup> A. Szent-Gyorgyi: "Identification of Vitamin C", *Nature*, Volume CXXXI, February, 1933, page 225.

- (101) J. L. Svirbely and A. Szent-Gyorgyi: "Hexuronic Acid as the Antiscorbatic Factor", *Nature*, Volume CXXIX, April, 1932, page 576.
- (102) J. L. Svirbely and A. Szent-Gyorgyi: "Hexuronic Acid as the Antiscorbatic Factor", *Nature*, Volume CXXIX, May, 1932, page 690.
- (103) J. L. Svirbely and A. Szent-Gyorgyi: "The Chemical Nature of Vitamin C", *Biochemical Journal*, Volume XXVI, 1932, page 365.
- (104) J. L. Svirbely: "The Ascorbic Acid Content of the Adrenals and Livers of Different Animals".
- (105) Tillmans: Quoted by Svirbely (34).
- (106) L. Vargha: "Monoacetone Hexuronic Acid", *Nature*, Volume CXXX, December, 1932, page 847.
- (107) W. A. Waugh and C. G. King: "Isolation and Identification of Vitamin C", *Journal of Biological Chemistry*, Volume XCVII, July, 1932, page 325.
- (108) G. Wald: "Vitamin A in the Retina", *Nature*, Volume CXXXII, 1933, page 316.
- (109) S. S. Zilva: *Nature*, Volume CXXIX, May, 1932, page 690.
- (110) S. S. Zilva: "Hexuronic Acid as the Antiscorbatic Factor", *Nature*, Volume CXXIX, June, 1932, page 943.
- (111) S. S. Zilva and J. Gough: "The Silver Nitrate Staining Reaction for Ascorbic Acid in the Adrenal, Pituitary and Ovary of Different Animals", *The Biochemical Journal*, Volume XXVII, 1933, page 1279.

## Reports of Cases.

### STRANGULATED INGUINAL HERNIA IN A CHILD AGED FIVE WEEKS.

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BABY J.M. was seen on May 29 at 10 a.m. with a history that during the previous night he had been very peevish. His peevishness was said to be due to an attack of "wind", and at about 10 p.m. he screamed and was in continuous pain thereafter during the night and morning.

When seen, the baby had its legs drawn up and was crying continuously. There was a large swelling in the right inguinal region, extending into the scrotum. It was very tense and could not be reduced by taxis. A diagnosis of strangulated inguinal hernia was made and preparations were made for immediate operation. Chloroform anaesthesia was induced by Dr. J. S. Le Fevre. No stomach wash-out or enema was given, but every precaution was taken to minimize shock. The usual incision was made and a dissection directed towards demonstrating the tumour mass. This proved to be an indirect inguinal hernia, invested by the usual layers. The sac, on being opened, was full of blood-stained fluid. The bowel itself (small), of which there were 12.5 centimetres (five inches) outside the abdominal cavity, was very angry-looking and edematous, in sharp distinction to the normal colour of the bowel above the constricting band of the internal ring. According to some authorities, it would be debatable whether this bowel was "safe" for returning to the abdominal cavity, but in the absence of constriction-slough, ecchymosis or lymph on its surface, it was given the benefit of the doubt and the operation was completed by a modified Bassini technique. The patient was returned to the ward in good condition after forty-five minutes and, apart from blood-stained motions for twenty-four hours, made an uneventful convalescence.

Interesting features of the case are: (i) The extreme youth of the patient for this operation. (ii) The absence of vomiting at any stage before or after operation. (iii) The absence of shock. (iv) This baby was born of a mother who had eclampsia with twenty-four major fits, and it was only 1.02 kilograms (two and a quarter pounds) in weight at birth, though a full-time child. At the time of operation its weight was 2.01 kilograms (four and a half pounds) and it is now 2.25 kilograms (five pounds).

## Reviews.

### ADVANCES IN MEDICINE AND SURGERY.

IN a foreword to "Recent Progress in Medicine and Surgery", edited by Sir John Collie, Lord Horder sounds a word of warning to the reader that the book is one for slow perusal.<sup>1</sup> This is undoubtedly true, for the amount of information presented is amazing.

The book is divided into twenty-one chapters, each treating a different subject. The authors of these chapters have been wisely chosen; the reader has only to glance at the list of their names to satisfy himself on this point. The range covered is remarkable, and the majority of advances made in medicine and surgery during the past fifteen years are recorded, though we note that gynaecology and obstetrics and dermatology are not represented in the series.

In reading the book one is tempted to make note of what appeared to be important omissions, only to find that a subsequent chapter would deal with these. There is some overlapping of subject matter, the most glaring example of this being the description of the ketogenic diet for bacilluria which appears in both the chapters on urology and vitamins.

The serum treatment of acute poliomyelitis is at present a subject of contention. Australian practitioners who have seen the successful results obtained in this country will find it difficult to accept the scant dismissal of this method. We also feel that the statement made on page 51, that "acute poliomyelitis is rarely suspected, unless in times of epidemic, before the paralysis appears", is equally difficult to accept.

The chapter on the diagnosis and treatment of peptic ulcer is of particular interest tempered with amazement at the diet mapped out for the gourmet. R. D. Lawrence writes on diabetes and glycosuria as those who have enjoyed his previous works expect him to write. The chapter on vitamins is extremely well handled as is that on pernicious anaemia, and the article on manipulative surgery will provide much food for thought and reveal good reason for the popularity of the unqualified osteopath.

The book is well printed on good paper and is a pleasure to handle. Misprints are conspicuous by their absence, only one being detected in a careful search. This book can be recommended with confidence as an exceedingly useful addition to the practitioner's library.

### MUSIC AND BROADCASTING.

WHILE music gives pleasure to a larger circle of devotees than any other of the arts, many people condemn its loveliest flights as highbrow or unintelligible and therefore incapable of being enjoyed. And those who insist that they cannot endure sonatas or symphonies, Beethoven or Bach, are often obstinate in their unwillingness to submit to enlightenment. Perhaps they are merely parrying a sense of inferiority begotten of their incomprehension; perhaps they dislike mental effort, or maybe they dislike musicians. Certainly by those of us for whom the work of the giants of music has no meaning an effort in understanding has to be made. But there is a prize to be won, and we may well give heed to the musically initiated who tell us how richly our effort shall be repaid. Opportunities for hearing music of every type are now, through the power of wireless transmission, greater than they have ever been. Anything from a Scarlatti sonata to the latest croon may be heard in almost every home. The appearance of Dr. Keith Barry's book, "Music and

<sup>1</sup> "Recent Progress in Medicine and Surgery, 1919-1933", by Various Authors, edited by Sir John Collie, C.M.G., M.D.; 1933. London: H. K. Lewis. Demy 8vo., pp. 280, with 38 illustrations. Price: 16s. net.



the Listener",<sup>1</sup> is therefore most opportune; and since many followers of Æsculapius are also worshippers at the shrine of Apollo, it has seemed fitting to draw attention to the book in these pages. "Music and the Listener" is written plainly for the plain man, the average listener who has heard much music and understood little. Dr. Barry sympathetically realizes his difficulties and skilfully endeavours to make smooth for him the path to better musical understanding. It is evident, however, that development of such understanding will be possible only in those people with an intrinsic faculty for musical appreciation.

The book deals with the origin of music, with the meaning of its terms, and with the essence of the various musical forms. It explains the many parts that comprise an orchestra and how, in appreciating orchestral music, it is necessary to listen to all these parts; descriptions are given of musical instruments, and there are photographs of orchestras as well as detailed pictures of the oboe, bassoon, French horn and clarinet. It is strange, by the way, that we so often presume to criticize orchestral performances without even knowing the names of the various instruments, and certainly without being able to pick out their notes in the general harmony. With a keen sympathy for the listener who is bewildered by the mere term sonata or symphony, Dr. Barry shows how such bogies may be banished in the light of understanding and how these compositions may be appreciated and enjoyed. No longer need fugues and chamber music be anathema to the average listener—their announcement the signal for a hasty turning to more succulent entertainment. So simply and lucidly does Dr. Barry explain the most intimidating terms that they must surely cease to have terrors. In addition, a most useful general impression is given of the landmarks in musical history; and the description of the evolution of musical instruments, from the lute and viol to the violin and from the spinet and clavichord to the modern piano, is interesting and instructive.

Such a book as this is not written for those for whom music already stands preeminent among the arts in its blending of content and form, nor for those who know the joy and satisfaction of dwelling in its high places. But for music lovers who are in need of guidance Dr. Barry has provided invaluable assistance; encouraged by the explanations and advice given in this book they may experience greater pleasures and perhaps scale loftier heights.

#### EXPERIMENTAL PATHOLOGY.

EXPERIENTIA DOCET may be translated either as "experience teaches" or as "experiment [that is, trial] teaches". In the wards of our hospitals and in ordinary pathology, the former in general holds sway, and time and again we are reminded of the wise words of Hippocrates, that this same experience may be fallacious and that judgement is difficult. In "A Handbook of Experimental Pathology", G. Wagoner and R. P. Custer show how a course given to second year students in the University of Pennsylvania may teach the subject by planned experiments and trials.<sup>2</sup> The work opens with an excellent account of the surgical technique required and the experimental methods adopted, together with guides to the care of the animals employed. A long series of experiments are described which illustrate many of the lesions, here deliberately produced, met with in general and surgical pathology, including the changes due to infection and immunity, to alterations in the endocrine system and in the intake of vitamins, and to hypersensitivity. At the

end of each experiment, the results expected are more or less suggested by the questions that the student is asked to answer, and references are, where necessary, given to authoritative accounts of the matter under investigation.

We have found much of profit and interest in the book and many unsuspected sidelights on problems that confront us. There is no doubt that a student, working through these experiments, or seeing them done by others, and following up the after-histories, will be impressed by the results and will be able to apply much of what is learned thereby to his study of disease in man. How, in the present crowded state of the medical curriculum, time can be found for such a course, without a corresponding loss in bedside observation and the study of human material, will be a puzzle to teachers in British schools. As many of the animals have to be kept for some while after recovery from the operation, their extensive employment in this way may also seem hardly justified to those who hold that their use in general should be for the advance of knowledge and only in special circumstances for the redemonstration of results fully established. Even though the experiments may not be actually undertaken, the volume before us is full of instruction both for the teacher and the student, and will help both to a fuller grasp of the principles of pathology.

#### ELECTRICAL THERAPY.

THE fact that it has reached its seventh edition since 1905 is striking evidence that Dr. Cumberbatch's "Essentials of Medical Electricity" is regarded as authoritative by students and practitioners of physiotherapy.<sup>3</sup>

The various types of electric current, their source and methods of application are dealt with in the author's usual thorough manner, with good illustrations and diagrams.

The section on "High Frequency Currents" has been expanded into seven chapters with increased detail of the various methods of application.

Besides the more generally known and used methods the production of artificial fever (pyrotherapy) by the diathermic current and Hertzian waves is described.

As regards dosage it is interesting to note that the author states that in treatment of infection of pelvic organs in women, and of prostate and seminal vesicles in men, it is now possible to give the exact or nearly exact dose that yields best results. As regards other diseases, he holds that experience is insufficient to state the ideal.

In addition to chapters on "medical" diathermy there are descriptions of the various "surgical" methods, that is, coagulation, desiccation or fulguration and the arc-operation by the cutting current. This latter is briefly described, but the advantages and difficulties in different tissues are clearly indicated.

An index of electrical treatment gives some idea of the very many and varied conditions the medical electrician undertakes to treat, many of them certainly not according to accepted ideas as to rational treatment. This index to treatment is indeed the weakest point in the book.

A chapter on "Physical Principles" is introduced. It serves as a reminder, but is necessarily too brief for any other purpose, and therefore might have been omitted without detracting from the value of the book.

The volume concludes with a series of plates showing motor points and skin areas with the cutaneous nerve supply. Altogether the book is very complete and brings to the practitioner the experience of a recognised expert in his subject and can be confidently recommended to those interested.

<sup>1</sup> "Music and the Listener: A Guide to Musical Understanding", by K. Barry, M.B., Ch.M.; 1933. Melbourne: Robertson and Mullens, Limited. Crown 8vo., pp. 126. Price: 2s. 6d. net.

<sup>2</sup> "A Handbook of Experimental Pathology", by G. Wagoner, M.D., and R. P. Custer, M.D.; 1933. London: Baillière, Tindall and Cox. Royal 8vo., pp. 176, with illustrations. Price: 23s. net.

<sup>3</sup> "Essentials of Medical Electricity", by Elkin Cumberbatch, M.A., B.M., D.M.R.E., M.R.C.P.; Seventh Edition, revised and enlarged; 1933. London: Henry Kimpton. Demy 8vo., pp. 522, with 15 plates and 132 illustrations. Price: 10s. 6d. net.

## The Medical Journal of Australia

SATURDAY, MARCH 10, 1934.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

### BOVINE TUBERCULOSIS AND ITS ERADICATION.

In February of last year attention was drawn by means of a special abstract and a leading article to an investigation carried out in Glasgow by J. W. S. Blacklock on tuberculous disease in children. It was pointed out that Blacklock found a large proportion of bovine tuberculosis in children. Mention was also made of work done in Australia on the same subject by Reginald Webster, and emphasis was laid on the necessity for the protection of children from both the human and bovine types of bacillus. Since prevention of tuberculous infection (as, indeed, of any other infection) is more important than treatment of the established disease, readers of this journal should be made conversant with an important piece of experimental work undertaken recently under the auspices of the Medical Research Council of Great Britain by Dr. L. Jordan, Veterinary Pathologist to the Hannah Dairy Research Institute, Great Britain.<sup>1</sup>

In the first part of his report Dr. Jordan deals with the need for eradication. He points out that

the total loss in cattle slaughtered in Great Britain under the Tuberculosis Order approximates £750,000 per annum. He also discusses the incidence of tuberculosis in human beings and shows that £500,000 is spent every year on sanatorium treatment alone. Cattle raising, of course, is an industry, and it will probably be necessary to show the owners of herds that freedom from disease in their animals will result in financial gain. But when human disease transmitted by cattle is in question, there should be no need to balance the industrial ledger against human well-being. No attempt will therefore be made to discover figures relating to expenditure on tuberculous cattle in Australia. In Jordan's experiment it was necessary to secure the cooperation of cattle owners, and this was done by carrying out the investigation without cost to the cattle owners. At the end of the three years during which the experiment lasted, the owners of the herds were found to be in possession of healthier animals and thus to have made a considerable financial gain.

The experiment was carried out in an area of nine square miles in the south-west of Scotland. The area was bounded by good roads and contained thirty-seven farms. Three farm owners refused to participate in the experiment; two had already licensed tuberculin-tested herds; two dropped out later. The scheme finally included thirty farms. The animals were tested with tuberculin. Those that reacted were as far as possible isolated from those that did not react, and premises that had contained infected stock were thoroughly disinfected. No undue pressure was exerted on owners to make them dispose prematurely of valuable reacting cows unless the cows manifested clinical signs of tuberculosis. Every herd was tested at the end of six months, and the necessary adjustments were then made in the details of isolation and so forth. Of the thirty herds participating in the scheme, twenty-eight made substantial progress, twenty being free from infection at the final test. Eight herds were found to be free from infection at the initial test, and, with two exceptions, remained free from infection. The reinfection in these two herds was slight, and both were clean at the final test. Nine herds commencing with an initial infection of

<sup>1</sup> "The Eradication of Bovine Tuberculosis", by L. Jordan, Ph.D., M.R.C.V.S., Medical Research Council of the Privy Council, Special Report Series, Number 184; 1933. London: His Majesty's Stationery Office. Pp. 164. Price: 2s. net.

less than 25% were free from reactors at the final test. In addition, three other herds, with initial infections of 26.8%, 33.3% and 41.6% respectively, were also free from infection when the final test was made. Among eight of the remaining ten herds in the area substantial reductions were effected in the number of reactors, an average initial infection of 51.8% having been reduced finally to 23.7%. It was anticipated that four of these herds would be free from reactors within four years from the commencement of the undertaking. In the two remaining herds no consistent efforts were made to eradicate the disease. As a result, one herd showed an increased infection from 36.9% at the first testing to 54.7% at the last. The other showed an increase from 49.0% to 61.6%. A general improvement was shown in all the cooperating herds; this improvement was accompanied by an increased valuation and an increased demand for animals from the tuberculosis-free herds.

Only an outline of Jordan's investigation has been given. Pathologists, public health experts and others interested in tuberculosis will read the full report. The main thing to be remembered is that Jordan has shown once again that preventive medicine is not merely an academic subject. To quote the words of the Medical Research Council in the preface to the report: "The report gives a good example of the way in which a field investigation, carried out under careful scientific control, may lead to conclusions of great practical importance." This is the kind of work of which the public should be made aware. Medical practitioners, moreover, will be able to see in it another link binding them to those who practise veterinary medicine.

### Current Comment.

#### MALARIA.

THE reawakened interest in malaria continues. An amazing amount of clinical and biological knowledge is being acquired. Perhaps the most remarkable feature is that only a few years ago it was thought that nothing remained to be learnt of the clinical and little of the biological phenomena of malaria. Some interesting observations have recently been made by John Lowe at a leprosy

hospital in India.<sup>1</sup> His patients had all suffered from malaria at some time, but not for twelve months or longer; it could be said that they were free of malaria until they acquired a fresh infection while under his observation. Thirty-seven patients were infected naturally with *Plasmodium vivax*. The onset in every case was sudden, with rigor. This differs from the type of onset experienced by patients who have never been previously infected; they usually pass through a period of a few days' pyrexia before the development of the typical paroxysms. The second interesting feature was that the fever was quotidian. Doubtless this was due to the maturation on alternate days of two broods of the parasites; it is in accordance with James's experience with artificially induced malaria in England. It would appear that many factors are concerned, not least of which is the particular strain of parasite. Lowe withheld quinine in sixteen cases; in five of these quinine eventually had to be administered because of the weakening effect of the quotidian paroxysms; in the remaining eleven the parasites disappeared and the fever subsided without treatment, after a period of three to fourteen days from the time of the initial paroxysm. Of the patients who had received treatment, none suffered a relapse during a period of six months. Two of the untreated patients suffered relapses, in which the fever was tertian; one of them had a second relapse. No treatment for the relapses was necessary. In one case, about three weeks after spontaneous arrest of malaria, parasites appeared in the peripheral blood, but caused no pyrexia. Manson-Bahr remarks that most rigors occur between midnight and midday; in this series they nearly all occurred between 2 p.m. and 4 p.m. Lowe suggests that the blood sugar content, which tends to rise after food and exercise, may have an influence on the time of the rigor.

Lowe also studied patients infected with *Plasmodium falciparum* under similar conditions. The fever was quotidian and remittent at first, and in several cases in which treatment was withheld tended later to become tertian in type.

The clinical manifestations described in this paper make it obvious that Lowe's patients had developed some degree of immunity before the commencement of his observations. There can be no doubt that the acquired immunity had an important influence on the course of the disease in his series. He makes no mention of this.

The study is an important one, made under unusual natural conditions that could not be reproduced experimentally.

#### INTESTINAL OBSTRUCTION.

ONE of the most dreaded of abdominal catastrophes is obstruction of the intestines, whether it occurs after laparotomy or from causes unrelated

<sup>1</sup> The Indian Medical Gazette, January, 1934.



to previous surgical intervention. Recent reference to the practical side of the subject has been made by A. Aspinall and H. H. Schlink, and the care given by surgeons to the problems of surgical relief of the fully developed condition and prevention is an index of the seriousness of such accidents. But, as with many of the similar problems that vex the practitioner of medicine, the whole question is not yet solved. Difficult is often the solution of the question of successful treatment; but in this is wrapped up the still more obscure question, what is the cause of the urgent symptoms, and just why does death so swiftly follow acute obstruction? Some years ago great hopes were raised that treatment directed towards the neutralization of the toxins of the bacillus of Welch would prove successful in otherwise fatal cases. But the hopes have not been altogether justified, and considerable doubt has been cast on the theory that this organism was responsible for the majority of the symptoms. Other bacteria have been blamed also, but the position is still far from clear.

N. B. Taylor, C. B. Weld and G. K. Harrison have recently carried out some research work on this subject, using the experimental method.<sup>1</sup> In a preliminary discussion in their paper they point out that any theory of bacterial absorption has the drawback that obstructions of the lower bowel cause less urgent symptoms than those in the higher reaches of the intestinal tract, in spite of the fact that the bacterial concentration is much greater in the lower part of the intestine. The same holds good in the case of the products of protein decomposition, which have also been incriminated. In making these strictures the authors omit to take into account the varying capacity for absorption of different substances displayed by different parts of the alimentary tract. But, none the less, there are difficulties in the way of such hypotheses. The authors then turn to the rival theory of loss of water and chloride from the body and describe a series of experiments carried out in order to establish the place of dechlorination in the causation of the lethal symptoms observed in intestinal obstruction.

Pursuing the observation that the isolation and closure of a loop of intestine caused death in spite of a free anastomosis of the intestinal tube, these workers divided the intestine of a dog in two places, reestablished the continuity of the bowel, closed the isolated loop at one end, and brought the other end out through the abdominal wall. This loop was allowed to drain for some months, at the end of which time the abdomen was opened and cultures were taken from the innermost part of the loop. These were found to be sterile. Once more the abdomen was opened and the loop freed and closed at the free end. Death promptly ensued. It was found that the loop could be freed from the abdominal wall and dropped into the peritoneal cavity with one end open without harming the

animal. No peritonitis followed, thus demonstrating the harmlessness of the contents of the loop. But if the abdomen was opened and the free end was closed, death followed as before. The death of these animals took place within thirty-six hours or little more, and the symptoms were those of acute obstruction. Two dogs survived, and investigation showed that the loop of bowel was filled with putrid material swarming with bacteria. Further experiments with a rubber balloon surrounding a tube placed inside the intestine proved that the distension of the bowel wall thus produced at will from the exterior set up severe or fatal symptoms, even though the lumen of the bowel was demonstrated to be patent. Thus the importance of the factor of distension was proved, though the earlier experiments did not seem to support the theory of bacterial intoxication, since the symptoms occurred so quickly after the closure of a loop that was virtually sterile. Thus the authors argue, though one would be inclined rather to agree with them when they say that their work falls short of providing a conclusive answer to the questions raised. They also turned their attention to the hypothesis of chloride loss as an explanation for the severe symptoms associated with obstruction. But they found nothing to support this, for their animals died before the fall in blood chlorides due to vomiting or other causes had occurred to any significant extent; moreover the blood chlorides may be reduced in animals to very low levels without any disturbance being noted. In discussing their results, they point out that the occlusion of the isolated loop results in distension of this portion of the bowel, a factor found to be very significant. In order to have some indication of the nature of the process at work they further experimented with denervation of a section of the gut, purposely choosing a portion of the upper alimentary canal, since it is in this part of the digestive tract that the most urgent symptoms arise. It was found that distension with some device such as a balloon did not severely affect the animal if the nerve supply had been previously divided. It was not found possible to avoid either passage on of the tube and balloon or eventual ulceration of the bowel wall by it, but obstructive symptoms, such as were observed in similar experiments on the intact bowel, did not occur.

The conclusions to be drawn from this work appear to be that while the effects of toxic absorption cannot be dismissed, the factors of distension and of reflex nervous disturbance are of great importance. In this connexion the stress laid by surgeons on the recognition and prompt treatment of distension, even though localized, will be borne in mind. More work, both clinical and experimental, is required on this difficult and important subject, and the swiftness with which death can occur, not only in the laboratory animal, but, what is of signal importance, in man after the onset of obstructive phenomena, should stimulate all to devote to it the close attention it deserves.

<sup>1</sup> *The Canadian Medical Association Journal*, September, 1933.

## Abstracts from Current Medical Literature.

### DERMATOLOGY.

#### Drug Eruptions.

M. B. SULZBERGER AND F. WISE (*Archives of Dermatology and Syphilology*, October, 1933) discuss many aspects of drug eruptions, with special reference to tests done with butesin picrate ointment. They state that there is no satisfactory method in testing in fixed drug eruptions, except in urticarial or eczematous forms. In these the patch test is valuable. The clinical evidence of sensitization occurred in from one week to thirteen days after use of the medicament was discontinued, which is analogous to sensitization from sera, arsphenamine and other drugs and plants. They distinguished three phases or periods in sensitizations of eczematous nature: (a) a period of refractoriness to sensitization which may last from days to years; (b) a period of incubation of sensitization which appeared to be relatively constant, the usual time being from one to two weeks; (c) a period of development of a clinically manifest reaction which is the time elapsing between contact with the excitant and the appearance of the clinical reaction in an already hypersensitive patient. This period usually varies from sixteen to forty-eight hours and seems constant in a given patient to a given excitant. In two cases in which butesin picrate ointment had been applied because of burns which had to a great degree destroyed the epidermis, the subsequent dermatitis affected the area surrounding the site of the burn and not the new epidermis covering the burned area. Nevertheless the new epidermis was not immune, as it reacted within twenty-four hours to a subsequent patch test. In two cases patch tests showed that the patients were hypersensitive to both butesin and picric acid. In another case the patient was hypersensitive to butesin and not to picric acid. It is concluded that trauma of this type particularly favours sensitization. In the patients found to be hypersensitive both to butesin and to picric acid it could be noticed that each of these substances had an individual more or less specific reaction. Butesin caused a persistent follicular eruption and deep oedema, with little redness, while picric acid caused diffuse severe erythema, little oedema and many minute non-follicular vesicles. The long duration of the eruptions in some of these cases, the continued new appearance of fresh lesions at distant points, and the severe and intractable pruritus which became generalized and lasted for many weeks after cessation of contact with the causal substance, lead to the conclusion that the condition is a combination of *dermatitis*

*venenata* due to external contact with a *dermatitis medicamentosa* due to absorption. Two further cases were briefly described of *dermatitis medicamentosa* due to local application of belladonna plaster and absorption of the drug through the skin. In both of these cases the area which had been occupied by the plaster remained unaffected.

#### Yeast-Like Fungi Found on the Skin and in the Intestines of Normal Subjects.

R. W. BENHAM AND A. MCH. HOPKINS (*Archives of Dermatology and Syphilology*, October, 1933) studied a series of one hundred young adults in normal health with a view to finding out the pathogenicity of various organisms often found connected with certain skin lesions, such as *erosio interdigitalis*, *perlèche*, *paronychia* and *diabetic intertrigo*. The so-called yeast-like fungi recovered in this survey were chiefly representatives of three groups: (i) the monilias, (ii) the cryptococci, (iii) the myodermata. A number of various strains are described, procured both from the skin and bowel. *Monilia albicans*, which is generally looked upon as pathogenic to man, was not recovered from the skin or the nails in any of the cases. Other yeast-like organisms, chiefly cryptococci and mycodermata, were obtained from the skin or nails in 72% of this series. Yeast-like organisms were recovered from the tongue or faeces in 80% of cases. *Monilia albicans* was found in the alimentary tract in 18% of cases.

#### Primary Leucosarcoma of the Skin.

W. N. GOLDSMITH (*The British Journal of Dermatology and Syphilis*, July, 1933) describes a case with the general characteristics of Sternberg's leucosarcoma. The patient was a man aged sixty-five years, and when first seen complained of lumps on the face which were infiltrated and of a copper colour. He had other flat infiltrations on the lower limbs and a fungating tumour on the outer side of the left thigh. The thigh tumour had been present about two years and suggested *mycosis fungoides*. The blood count revealed 300,000 white cells per cubic millimetre, of which 94% were lymphocytes. The case differed from the classical leucosarcoma in that: (a) though the tissue tumours were composed mainly of the usual monocytes, the blood leucocytosis was composed predominantly of small lymphocytes; (b) there were no hæmorrhages; (c) the primary tumour originated in the skin and was unusually malignant. The recent work on the subject was reviewed; it pointed to the probability that at least the three conditions known as lymphatic leucosis, leucosarcoma and lymphosarcoma are manifestations of the same disease and that the variations depend on differences in the individual attacked. The authors'

case, with its combination of small lymphocytes and monocytes, is considered to support the view. The nature and origin of the monocytes is also discussed and a hypothesis as to the pathological sequence of events is put forward.

#### Celery Itch: Dermatitis Due to Celery in Vegetable Canning.

S. A. HENRY (*The British Journal of Dermatology and Syphilis*, July, 1933) visited three factories, employing five to six hundred workers, where the process of canning celery was performed. Of the workers, 4% suffered from a dermatitis apparently due to the handling of celery. The great majority of those affected were under thirty years of age. Transference to other work and treatment cured the majority in one to four weeks. It is suggested that the main causative factor is limonene, a hydrocarbon of the terpene series and a constituent of celery oil. Water, friction and individual susceptibility play their respective rôles as preparatory causes. It was suggested that the workers' hands be smeared with liquid paraffin before they started work.

### UROLOGY.

#### Prostatic Resection.

WILBUR HAINES (*Urologic and Cutaneous Review*, May, 1933) submits a survey of his first year's experience with transurethral prostatic resection. After criticizing the eulogistic descriptions of this procedure by some earlier American authors, he emphasizes the dangers of the operation, particularly that due to "urethral shock". Resection cannot be regarded as a general substitute for prostatectomy. Minute attention must be paid to detailed pathology as demonstrated cystourethroscopically in the selection of suitable cases. Using Ranoall's classification, the author makes the following statements as regards operation. Cancer: "If the case can be satisfactorily instrumented, resect." Median bar is always resectable and should give the best results. Glandular hypertrophy: (a) Intraurethral bilateral hypertrophy is difficult to resect satisfactorily and is liable to failure because the two lobes collapse against each other and the bladder muscle cannot force urine between. (b) Solitary middle lobe obstructs the function of the trigonal muscle. Resection usually cuts the muscle and function is restored, provided that the lobe is not too large. (c) Combined middle and lateral lobes: resection of the whole middle lobe and the lateral lobes between four and eight o'clock may be satisfactory. Removal of the middle lobe may allow collapse of the lateral lobes as in (a), and resection fails. (d) Enlargement of the sub-

cervical glands of Albarian alone acts as a ball valve; it is difficult to diagnose, but resection should give a brilliant result. (e) Subcervical and lateral lobe enlargement may produce a gigantic growth. For these prostatectomy is certainly more satisfactory. The author concludes: "If cases are selected on a definite pathological basis, and this can only be attained by a considerable clinical experience combined with a thorough knowledge of living and post mortem pathology, and if there is adequate pre- and post-operative care with a well developed technique executed with surgical skill, resection is the logical and sane procedure to employ."

HEITZ BOYER (*Journal d'Urologie*, August, 1933) describes a new instrument adapted for prostatic resection by the endoscopic route, and states his present conception of the indications for this operation: (i) A pedunculated median lobe with only slightly hypertrophied lateral lobes is a strong indication and the results are excellent. (ii) Patients of advanced age and in poor general condition. In such cases, provided the resection is carried out carefully and in several sittings if necessary, the indication is definite. (iii) A third indication, only relative at present, but probably becoming more favourable as technique improves, occurs when the lateral lobes are fairly large and the median lobe is not pedunculated, but broadly implanted. (iv) In cases resembling the last mentioned, but with extremely developed lateral lobes, the test of suitability for endoscopic resection is best made by observing the effect of hydrostatic pressure during cystourethroscopy. If under pressure of the irrigating medium the lateral lobes separate easily and definitely, resection may be tried, but promises of cure must be guarded. Contraindications to the endoscopic route are the presence of lateral lobes, without any median lobe or bar; also when urinary infection cannot be efficiently controlled before the intervention.

#### Significance of Hypochloræmia in Surgery.

F. LEGUEU AND B. FEY (*Journal d'Urologie*, July, 1933) draw attention to the pre-operative and post-operative study of the blood chlorides, a subject somewhat neglected in the past, although the nitrogenous content has received considerable attention. It is pointed out that, although the subject is as yet only partly understood, the renal cell evidently cannot excrete waste substances to the best advantage, except in a medium of fixed composition containing neither too little nor too much chloride of sodium. Pre-operative and post-operative studies were made in thirty-four simple operative cases and in a separate series of 53 prostatectomies. The following results were constantly found: (i)

In the blood: (a) a temporary elevation of the urea percentage; (b) a temporary decrease of the chloride percentage, and especially important is the ratio of the total chlorides to the plasma chlorides, the former being always clearly decreased, so that the ratio is always definitely lowered. (ii) In the urine: (a) Oliguria, because water is retained in the body. (b) Nitrogenous substances are in excess, because of "histolytic ureogenesis" causing an increase of these substances in the tissues and blood. By reason of the reserve concentrating power of the kidneys the sudden excess is adequately dealt with and the blood nitrogen returns to normal in two or three days, but trouble may arise if the kidneys are not normally functioning organs. (c) Less well understood are the disturbances of distribution and elimination of chlorides. While there is hypochloræmia, nevertheless the urinary chlorides are also found to be lowered. This study excludes cases in which vomiting or diarrhoea can cause chloride loss. Evidently the chlorides are seized upon by the tissues, particularly traumatized tissues, and held there temporarily so that they accumulate neither in the blood nor in the urine. The therapeutic implications are important. When, by chloride injection, the chloræmia is reestablished at a normal level, both diuresis and an improvement in the concentrating power of the kidneys are noted. Before any serious operation it is wise to estimate the blood chlorides, just as in the past the blood nitrogen or blood urea has been estimated. Then, if signs of shock, uræmia *et cetera* arise in the early post-operative course, a fresh estimation of the blood chlorides will act as a definite indication of the advisability or the reverse of intravenous injection of 10% salt solution (hypertonic) and of the amount to be injected.

#### Lithogenic Power of Certain Bacteria.

J. FISCH (*Journal d'Urologie*, June, 1933) noticed that on incubating the infected urine of patients with lithiasis, crystals deposited after a certain lapse of time. Researches were therefore commenced in order to determine whether certain germs possessed a special lithogenic power. The culture medium used in all the experiments was the proved normal urine of a healthy human subject. The germs used in the experiments came from two main sources: (a) from the urine of patients suffering from calculous disease or the passage of gravel, (b) from the urine of patients suffering from infection of the urinary tract, but in whom no sign of calculous disease or gravel had existed. Normal urine was used as a control in every case. In Group (a) forty-eight hours after inoculation there was an abundant microbic flora with very numerous crystals of ammonio-magnesium phosphate; while in Group (b), though the germs

developed abundantly, no sign of crystals appeared at all. On the third day in Group (a) crystals of urate of ammonia made their appearance among the triple phosphate crystals, while in Group (b) there was still no sign of crystals of any kind. Not until the fourth, fifth or even the sixth day did triple phosphate crystals appear in the test tubes of Group (b). It is certain that the germs produced at the expense of nitrogenous constituents of the urine (urea principally) varying amounts of ammonia, which combined with phosphoric acid, magnesium, uric acid *et cetera* in the urine to form the above-mentioned crystals. Thus germs coming from a urinary tract infection without lithiatic tendency cause the formation of triple phosphate only after a considerable interval and never cause formation of urate of ammonia; the latter holds good for periods as long as thirty days in the author's experiments. The conclusion is that the precipitation of substances normally held in solution in the urine is favoured by the presence of urea-splitting germs, and particularly those which cause the formation of ammonia in excess, and consequently the formation of ammonium urate. The chief microbic offenders were found to be the *Bacillus coli*, the *Bacillus pyocyaneus* and the *staphylococcus*. Once precipitation has begun it may continue in spite of disappearance of the germs. The most rapid precipitation is caused by the *Bacillus pyocyaneus* and the *Bacillus coli*.

#### Cutaneous Ureterostomy after Nephrectomy for Tuberculosis.

A. SCHUNK (*Journal d'Urologie*, March, 1933) advocates cutaneous ureterostomy in order to deviate the urine from the bladder in cases in which intolerable pain persists in the latter organ after nephrectomy for tuberculosis. The ureterostomy is performed on the opposite or healthy side, and the classical technique of Marlon is preferred. After the ureter is attached to the skin of the iliac region, a number 20 French rubber catheter is passed right up to the renal pelvis. It has been found that the patient is not kept dry unless the catheter is passed right up into the renal pelvis. Exclusion of the bladder not only relieves the patient of his intolerable vesical symptoms, but obviates the danger of tuberculous infection of the remaining kidney by ureteric reflux. The author reports on five cases, and in none of these did atony occur, a complication reported by other authors. The determination of this point has been made possible by intravenous urography. The great advantage of the iliac position for the ureterostomy is that the patient can care for the opening himself. The opening permits a longer survival than if nothing were done to deviate the urine, and the patient can lead a reasonably active and useful life.



## Special Articles on Treatment.

(Contributed by request.)

### XXVII.

#### THE TREATMENT OF PERNICIOUS ANÆMIA.

As a result of the recent work of Castle and of Wilkinson, it is now possible to state clearly the rationale of the treatment of pernicious anemia. Pernicious anemia is a deficiency disease occasioned by the absence from the gastric secretion of an enzyme-like substance, the function of which is to interact with an extrinsic factor in the food to produce specific hæmatopoietic effects. Although pepsin and hydrochloric acid are almost invariably absent too, the intrinsic factor is distinct from both. There is still some disagreement as to the nature of the extrinsic factor; Castle regards it as similar in its characteristics to vitamin B<sub>12</sub>, but Wilkinson's arguments in favour of its being a constituent of protein food are more convincing. By their interaction the intrinsic and the extrinsic factors produce an active principle so similar in its effects to that produced by liver feeding that it may be concluded that the liver is normally the storehouse of this principle. The problem of the treatment of pernicious anemia is therefore to remedy the deficiency of the intrinsic factor or to supply the active principle itself in adequate amounts. In clinical work the latter procedure is the more practicable. It is accomplished by the administration of liver substance in some form, or of dried gastric tissue prepared in such a way that action of the intrinsic factor on the stomach muscle has been allowed to occur.

#### Effects of Specific Treatment.

The most characteristic and striking effect of specific treatment in pernicious anemia is the occurrence of a brisk reticulocytosis in the circulating blood. This commences within four days and reaches its maximum between the seventh and fourteenth day. The count at the peak of the reticulocyte response varies from 10% to 20%.

Coincident with the appearance of the reticulocytosis, there begins a marked amelioration of the patient's symptoms. Lethargy and malaise give way to a sense of well-being and the temperamental changes so often seen in this disease rapidly disappear. Diarrhoea, when present, yields less readily than the other symptoms, but persistence in treatment causes its disappearance by the end of the first week. *Achylia gastrica*, however, persists.

After the initial improvement progress is not so rapid and the total red count seldom rises to four million per cubic millimetre before the end of the sixth week of treatment. The increase in hæmoglobin is still slower, so that, as the count increases, the colour index becomes lower. A satisfactory level of the blood, once attained, can be perpetuated indefinitely by the persistent administration of small quantities of the active substance.

The response to treatment of the nervous lesions, both in pernicious anemia and in fully developed subacute combined degeneration of the cord is much less certain. In those patients in whom subjective symptoms dominate the picture, while organic signs are slight or absent, the results are excellent. On the other hand, when there are gross evidences of organic cord changes, such as marked ataxia and spasticity with extensor plantar reflexes, the response is variable and uncertain. In cases of this sort the nervous manifestations may continue to improve long after the blood count has returned to normal, and persistence in treatment with full doses of the active principle for many months is necessary. Liver in some form often produces satisfactory results in this regard, but Witts considers gastric substance more potent. Recently Sargent and others claim good results in subacute combined degeneration from massive and prolonged dosage with iron, but this is a matter which is still *sub judice*.

#### Liver Administration and Dosage.

##### Administration by Mouth.

Whole liver, raw or cooked, may be used; for the first weeks of treatment a daily ration of 240 grammes (eight ounces) is required. It is not necessary, or even desirable, to administer the liver in the raw state, but cooking should be brief, as there is some evidence that prolonged heating vitiates the active principle. Recipes for special dishes are numerous, but the simplest and most satisfactory of them all is the following. Mince the required amount of liver or chop it finely, boil or fry until it is just cooked through and add to soup just before serving. Whole liver has the advantage of cheapness, but it is not always easily obtained in good condition, and the necessarily large bulk and the sameness of the daily ration are apt to cause such distaste as to interfere seriously with its efficient administration. For these reasons, liver extracts, dry or in liquid form, are more often used. All the extracts issued by reputable manufacturers have given practical proof of their potency, but it is necessary to give them in relatively much larger amounts than the corresponding quantity of liver substance. For instance, the initial daily ration of extract should be an amount equivalent to 480 grammes (sixteen ounces) of whole liver. The exact equivalence of the various extracts differs, but it is usually stated by the individual manufacturer. Desiccated hog's stomach is equally potent and is rather more palatable than most of the powdered liver preparations; in the early stages of treatment thirty grammes appear to be an adequate daily dose. The greatest disadvantage of the use of liver extracts is their costliness; those in powder form are dear and the cost of the liquid extract is almost prohibitive. The peculiar meaty taste of the powder is repugnant to some patients; it can best be overcome by giving the required amount in soup, "Bovril" or orange juice.

##### Administration by Intramuscular Injection.

Highly concentrated extracts of liver for parenteral injection have recently been produced, and several such preparations are now on the market. It is not possible to calculate from the information given by the manufacturers the exact equivalence of these preparations in terms of liver orally administered. It is therefore wise to follow the maker's instructions, as the amounts recommended for different preparations vary. In general it may be said that there are two methods adopted: either a small daily dose is given or much larger amounts are injected at intervals of six or seven days. In emergencies large doses may be given daily for the first few days, and then administration may be continued by either of the above methods. As the injections sometimes cause considerable local pain, there is something to be said for use of the larger and less frequent doses.

##### The Maintenance Dose.

The administration of relatively large doses of liver, by either route, or of desiccated stomach by mouth is continued until the patient has reached the optimum condition as judged by the blood count and the general clinical features. To maintain this improvement a regular maintenance dose must be taken for the rest of the patient's life. The requisite amount must be determined individually for each patient; as an indication it may be stated that 120 grammes (four ounces) of whole liver, or twice the equivalent amount of liver extract, or 15 grammes (half an ounce) of desiccated stomach twice or thrice weekly are usually needed. If a preparation for injection be adopted, the dosage may be relatively larger and less frequent, but no specific amounts can be stated, owing to the variations in strength of the different products in use. Should the patient neglect to take the maintenance dose, relapse is inevitable, and treatment with large doses must again be initiated, and, fortunately, the response is just as satisfactory as when the disease is being treated *de novo*.

## Auxiliary Methods.

The eradication of septic foci and the treatment of septic complications are of paramount importance for reasons which will be made clear in the subsequent discussion of the results of treatment.

The satisfactory results of treatment with liver and with dried stomach have rendered other methods almost entirely superfluous. In patients who are desperately ill one or more blood transfusions may still occasionally be needed to tide them over the period which must elapse before the effects of specific treatment are manifest. But the rapidity of the response to liver given intramuscularly has almost obviated the necessity for transfusion. Dilute hydrochloric acid given by the mouth has no effect on the course of the disease, but it may be given to the small percentage of patients in whom it stimulates appetite and aids digestion. Just before the advent of liver treatment Koessler and Maurer published some interesting work on the beneficial effect of a diet rich in vitamins A and B. Their findings were neglected during the first wave of enthusiasm aroused by the success of liver feeding, but recent work has indicated that vitamin B is at least a useful adjuvant and that it may perhaps have a specific effect. The addition to the patient's diet of "Marmite" or of one of the concentrated vitamin preparations is therefore a wise measure.

## The Results of Liver Feeding.

The results of liver feeding are exemplified by the findings in a series of fifty consecutive cases of pernicious anemia seen in hospital and private practice. In forty-three cases the result was entirely satisfactory. It may be noted that five of the forty-three patients were subsequently readmitted to hospital for relapse caused by failure to persist with the treatment and that in them the second response to liver was as prompt and complete as the first.

In three instances the response was delayed and incomplete. These three patients all had complicating infections; in one gross dental sepsis was present, in another severe pyelocystitis, and in the third cholecystitis. In all of them appropriate treatment of the infection accelerated the response to specific measures.

Two patients failed utterly to respond and died after some weeks, in spite of intensive treatment with whole liver and liver extract by mouth and repeated transfusions of blood. At autopsy both showed the typical lesions of pernicious anemia; in addition, one had advanced pyelonephritis and the other suppurative cervicitis and gross urinary infection. These two groups of cases emphasize the facts that the presence of infective lesions retards or even renders nugatory the effect of liver feeding, and that the elimination of septic foci is an essential part of the treatment of pernicious anemia.

There were in this series two instances of inscrutable failure. Both the patients took liver by mouth in adequate amounts and over a period sufficiently long to justify the expectation of a satisfactory result, yet both went steadily down hill and died within a few weeks. In both instances *post mortem* examination confirmed the diagnosis and demonstrated the absence of complications. Other observers have also reported similar inexplicable failures. There is reason to believe that dried stomach will sometimes prove successful when liver has failed, but the two cases here referred to occurred before its introduction. It is also possible that the more rapid and intensive effect of intramuscular liver may avert such disasters. These points should be borne in mind if a patient in whom no complications can be demonstrated is responding poorly to the administration of liver by the mouth. It must be emphasized, however, that failures are very rare and that the discovery of the specific treatment of pernicious anemia constitutes one of the great advances of modern medicine.

S. O. COWEN, M.D. (Melbourne),

Honorary Physician Attending  
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## British Medical Association News.

## SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Medical Society Hall, East Melbourne, on September 6, 1933, Dr. W. G. D. UPJOHN, the President, in the chair.

## The Correlation of X Ray and Clinical Findings in the Diagnosis of Chest Diseases.

DR. DOUGLAS THOMAS and DR. KEITH HALLAM presented a paper entitled: "The Correlation of X Ray and Clinical Findings in the Diagnosis of Chest Diseases" (see page 325).

DR. J. BELL FERGUSON stressed the importance of cooperation between the clinician and radiologist. In viewing films with the radiologist the clinician realized the extraordinary discrepancies between clinical and radiological findings in the average case; in early cases he could support the radiologist by the details in history of slight but definite symptoms.

With regard to the utility of X ray examination in lung tuberculosis, improvements in apparatus, standardization of technique, use of improved intensifying screens and greater experience in interpretation, had all helped to render X ray examination an absolute necessity in dealing with cases of lung tuberculosis both from the point of view of diagnosis and in deciding the best method of treatment and the control of treatment.

They had to consider radioscopy and radiography. Radioscopy was most useful in controlling various forms of treatment, especially the different forms of collapse therapy. Radioscopy detected the position of the mediastinum and small collections of fluid otherwise missed. "Flapping mediastinum" not suspected from manometric readings might be readily seen on screen examination. Paradoxical movements of the diaphragm might be well seen in some cases of artificial pneumothorax. Klenböck's phenomenon occurred in some cases of pyopneumothorax with a high intrapleural pressure. This was a paradoxical movement of the diaphragm downwards with expiration on the affected side, plus a movement of the mediastinum towards the sound side also during expiration.

In regard to the disadvantages of radioscopy, Dr. Bell Ferguson referred chiefly to the time taken up, at any rate in cases for diagnosis (dark room, allowing for accommodation of pupils *et cetera*).

Radiography, on the other hand, offered the most information in the shortest time, particularly in diagnosis. Information was concisely given of the presence of adhesions, thickened pleura, fluid, consolidation, cavity formation, fibrosis, calcification and even interlobar thickening, and progress films might be compared in detail.

Dr. Bell Ferguson asked for the opinion of others on the relative values of the flat film compared with stereoscopic films. Personally, he leaned towards an antero-posterior flat film *plus*, in many cases, a lateral view of the affected side. The lateral view was most helpful, although requiring more experience in interpretation. The interlobar planes were shown fully and lesions far back in the postero-mesial areas of the lungs and behind the heart were more easily seen. The lower apices were more clearly available for inspection and a low-placed upper lobe lesion was defined from a lower apical lesion.

There was a considerable saving in time and expense both in material and in handling, in favour of the flat film.

Stereoscopic films were on occasion very useful, particularly in determining the size and direction of adhesions during an artificial pneumothorax treatment. In Dr. Bell Ferguson's opinion they were not to be regarded as essential in every day routine.

Dr. Bell Ferguson asked the radiologists what were the minimal film indications upon which a diagnosis of early tuberculosis might be made. He felt that the tendency was rather to declare films normal than otherwise. In cases of suspected early lung tuberculosis he suggested that a radiograph of the accessory nasal sinuses should be made a routine procedure.

In conclusion, Dr. Bell Ferguson uttered a note of warning upon relying entirely on a negative X ray report for the exclusion of tuberculosis and quoted cases of hæmoptysis or pleurisy with no radiological signs, also cases of positive sputum from contacts with few or no symptoms and normal clinical and radiological findings.

In children the signs were very misleading and routine radiography was an essential.

Dr. COLIN MACDONALD congratulated Dr. Thomas and Dr. Hallam on their splendid cooperative effort. He could add little to the subject, their paper was so complete; and he could offer little criticism, their views and conclusions being so well balanced and convincing.

He experienced only one twinge of regret, and that was that Dr. Hallam did not touch on the historical aspect of this important subject of radiology of the chest. He felt that it was probably only for lack of time, for he remembered from the old days in Ormond College that Dr. Hallam belonged to a humanistic school of thought. Rightly or wrongly, he believed that the historical approach to a discussion of any subject was a very important aspect. It showed what difficulties had been encountered and how they had been overcome. It perhaps made the dogmatism of the moment wilt a little and shudder at how it would be assessed in the near future. In his specialty, too, it emphasized the fact that radiology was a very young member of the medical sciences. He remembered being deeply wounded some years previously, when an eminent surgeon described radiology as a bastard science. Whether that was true or not, it was a viewpoint he strongly opposed. Dr. Thomas and Dr. Hallam had shown that it was no poor unwanted thing, but that its aid was eagerly sought by the most dignified and honourable branches of medicine.

The first record of a contribution to the X ray diagnosis of diseases of the chest was due to a Dr. Charcot, of Paris, in 1896, only a few months after Röntgen's discovery, in November, 1895. This Charcot was not the celebrated J. M. Charcot of the Salpêtrière, who had then been in his grave for three years. From that time, however, until the arrival of the Coolidge tube in 1917, severe limitations were imposed on chest radiology by low-powered equipment. The senior physicians present would remember those days when only gross pathological change could be demonstrated radiographically, and screening ranked equally in importance with films, or plates. At that time a lagging of the diaphragmatic movements was considered an important sign of early tuberculosis, as was also the narrow vertical type of heart, but it was known now how many conditions other than tuberculosis might cause impaired diaphragmatic excursion, and how a narrow vertical heart was only an expression of a hyposthenic habitus. The importance of preliminary screening was nowadays discounted. He personally believed that it was still very valuable, not only diagnostically, but also for consideration of what films were to be made and at what angles. After 1917 came the Coolidge tube, the transformer, the intensifying screens, and the duplitized films, all helping in the attainment of instantaneous exposures which eliminated the lack of definition due to respiration and heart movement. The erect posture in the demonstration of the fluid level in an abscess or a hydropneumothorax had been practised before the war, as well as the method of telerradiography, to achieve sharpness of definition of small infiltrates; but until the high milliamperes, respiratory movement defeated the long-distance film. Long-distance stereoscopy of the chest came later, sponsored largely by the Americans, and had for a time a considerable vogue. Dr. Macdonald personally believed that chest stereoscopy had a very limited field, except

possibly in the localization of small apical opacities. Too often, he thought, it was a pleasing optical illusion. He contended that much more information was available by correctly exposed postero-anterior with right and left lateral films.

Certain pathological contributions of the last decade or so had helped the radiologist in the interpretation of the varying chest opacities. The work by the Prague pathologist, Anton Ghon, in 1912, on the mode of childhood infection in pulmonary tuberculosis, had made clear the nature of certain small, dense, isolated opacities commonly seen in the lung fields of children; these were now known to be a healed Ghon's primary focus.

Ludwig Aschoff's conception of the exudative and infiltrative elements in tuberculous lesions had explained the fuzzy mottling of recent lesions and the increase in sharpness of definition with absorption of the exudative element. Kennon Dunham, of Cincinnati, in 1920 described the fan-like opacities shown on the film of the very early tuberculous lesion in the adult and due to swelling on the lymph vessels draining the affected area. Dr. Macdonald felt that Dunham's fans had not sufficiently attracted the attention of the radiologist. Dr. Kenneth Cross was an apostle of Dunham, and on many occasions Dr. Cross had shown him their value as an interpretative sign; they believed that the Potter-Bucky diaphragm for the postero-anterior view was often essential for their early demonstration. Just recently, Dr. Edwards, of Sydney, had stated in a paper that the Potter-Bucky diaphragm should not be used in chest radiography. Dr. Macdonald believed this view to be entirely wrong. Not only was it essential in the resolving of the component parts of dense chest opacities, but in heavily built patients it was invaluable in the demonstration of early lesions. Admittedly it gave a different quality film from the non-Bucky exposures, but once the differences were learnt and appreciated he believed that much more information was available in the Bucky film. It was not necessary to emphasize how essential was the lateral view of the chest with the Potter-Bucky diaphragm for delimiting the lobes of the lung and recognizing lesions below the convex borders of the diaphragm. He could not imagine how stereoscopy could take its place in these aspects of chest anatomy.

Some years previously a theory on the spread of tuberculosis from the hilum along the peribronchial lymphatic had led Osler to remark that "no one more than the radiographer needed the salutary lessons of the dead-house". The error of this theory was due to the then imperfect technique and had long been thrown into the discard. However, the perihilar tuberculosis that was then spoken of had been shown, when lateral films were introduced, to be usually due to lesions in the apices of the lower lobes. Recently, Fishberg, of New York, drew attention to a prognostic sign that had been discovered many years before by a sage old London physician, Sir James Kingston Fowler, namely, that when young adults developed lesions above the clavicle they were always of very much better prognostic import than when they had an infraclavicular deposit, known in the German literature as an Assmann's focus. He knew of no explanation of this curious difference in prognosis, but he had been struck by its truth.

He heartily agreed with Dr. Hallam in the supreme importance of reexamination in all chest cases. There was a large percentage of cases in which a definite diagnosis could not be made on the one examination; two examinations over an interval of some weeks had ten times the value of a single one.

Dr. HOWARD PRAAGST directed his remarks mainly to the consideration of early pulmonary tuberculosis. He said that it had been for years the custom at the Melbourne Hospital to make a systematic X ray examination of the chest of all applicants for the nursing staff after they had undergone a thorough clinical examination. These films had proved very valuable as a standard for the healthy adult chest. It was interesting to note the number in which there was evidence of obsolete tuberculous infection, and instructive to compare these with further films taken



during the nurse's subsequent career, especially during influenzal and other non-tuberculous infections, and when, as occasionally happened, frank tuberculosis developed in other areas. He had not infrequently seen changes of similar type described as tuberculous disease. It was surely almost as serious a mistake for a patient to be erroneously branded as tuberculous as to make the opposite error; and Dr. Praagst differed from Dr. Bell Ferguson's opinion that radiologists were apt to be too cautious; he considered they were often not cautious enough in describing the presence of pulmonary changes. Although it was not the radiologist's place to diagnose activity or quiescence, he should, whenever possible, state whether a lesion appeared recent or old, and Dr. Praagst pleaded for the closest cooperation of physician and radiologist in such cases, and stressed the value of progress films.

Regarding technique, he strongly disagreed with Dr. Macdonald that flat films with the Bucky diaphragm were the best, and advocated the use of stereoscopic films taken at one metre in recognizing the early apical and subapical infiltrations. The standard of chest work that he had seen in America was high, and by far the majority of radiologists there favoured the long distance technique without the Bucky diaphragm. Reference had been made in the discussion to Dr. Dunham, of Cincinnati, whose investigations had been of inestimable value, and whose work was done with stereoscopic technique before the introduction of the grid diaphragm. Dr. Praagst outlined his reasons for advocacy of this technique, and stated that the only objection that could be raised was one of economy in hospital practice.

He also mentioned the paramount value of the X ray examination in recognizing cases of eventration, an example of which Dr. Hallam had shown, and in silicosis, where the findings were often so extensive with the physical signs relatively slight.

Dr. CHARLES E. DENNIS said that with reference to the question of the value of flat films as compared with stereoscopic films, he himself preferred the flat film, but he also used stereoscopic films; and when he had used both methods in conjunction he had found that with the stereoscopic follow-up his original diagnosis usually had been unchanged. A lateral view was often necessary, and, combined with the antero-posterior view, gave better information than the stereoscopic pair. Regarding minimal signs of tuberculosis, Dr. Dennis said that the appearance of Dunham's fan associated with little groups of "fluffy" areas of density were suggested of early tuberculosis. At Caulfield Repatriation Hospital all such cases were reviewed in three months' time and he had found that his early X ray diagnoses, whether positive or negative, were nearly always confirmed by the film taken later. In patients suffering from chronic nasal sinusitis there was often found increased density of X ray shadows in the hilar regions, and this was doubtless due to the congestion caused by chronic catarrhal infection of the respiratory tract. At Caulfield Repatriation Hospital a considerable number of patients presented themselves with a history of recent hæmoptysis. Here again the early X ray diagnosis was nearly always upheld by a review after some months. Dr. Dennis said that he had been watching the progress and improvement of radiological diagnosis for twenty-eight years and there had been a steady and rapid improvement in the technique of X ray examination of chests, especially since the war.

Dr. GEOFFREY PENNINGTON said that the clinical diagnosis of intrathoracic disease was one of the most difficult branches of medicine, in the early stages at least. In many instances the most one could say was that the patient was suspected of having some intrathoracic lesion, and, unless radiological examination was carried out, it was impossible to determine accurately the pathological condition present. Early acute lesions frequently were not manifested radiologically. In cases of pulmonary neoplasm the physician was faced with an almost impossible task in the early stages without the help of a radiologist. Dr. Pennington said he thought it did not much matter whether a stereoscopic, long distance, or

Potter-Bucky film was taken, so long as there was good collaboration between the physician and the radiologist.

Dr. FRANK STEPHENS said that he thought that in the discussion radiology had been dealt with rather too lightly. He himself considered it one of the most important steps in radiological examination, and the extent and sequence and the subsequent radiographic examination frequently depended on the result of the preliminary screening. Dr. Stephens thought that the time spent in a careful radiology often saved time in the long run. A preliminary radiology of the sinuses was sometimes a guide as to the nature and number of films to be taken.

Speaking of the relative merits of stereoscopic and flat films, Dr. Stephens said that it was by no means decided in the clinics of the world that one or the other method was superior. As recently as 1932 the Mayos, of Rochester, were using chiefly stereoscopic films, whereas most of the leading radiologists in England were using flat films.

With regard to the difficulty of the subject, he had been troubled not so much with the very heavy man of twelve stone or more as with the very fat woman with a relatively small thorax.

Dr. HENRY WATSON said that his work at Heatherton Sanatorium had not so much to do with early diagnosis as with treatment, and he was particularly concerned with the problem whether a patient had active tuberculosis in the contralateral lung. He hoped Dr. Hallam would give some indication of the solution of this problem.

He agreed that screening was important in the control of artificial pneumothorax, both in the sanatorium and after the patient was discharged, because the absorption of gas was frequently more rapid after the patient had returned to a more active life.

Dr. Watson emphasized the difficulty of determining the degree of activity of tuberculous lesions by radiological means.

Dr. W. OSTERMEYER expressed great interest in Dr. Praagst's reference to the routine radiological examination of the nurses at the Melbourne Hospital and the correlation of the early findings with subsequent examinations if they became ill, particularly with tuberculosis. In most medical cases the important problem to solve was whether the lesions revealed radiologically were active or not, and frequently this could be done only by comparing films at intervals.

Dr. Keith Hallam, in reply, referred to Dr. Bell Ferguson's defence of the physician and his clinical examination against his (Dr. Hallam's) criticism. He wished to explain that when criticizing the results of clinical examination on the score of interpretation of physical signs, he considered it was the method and not the physician that was at fault.

Concerning the value of antero-posterior and postero-anterior films of the apices of the lungs, Dr. Hallam said that these were often very helpful in this region, where lateral films were useless. The picture in each case was different because various blood vessels were seen at different angles, and the shadow of the shoulder girdle muscles was thrown in a different way in each case. For reasons of time he had not referred in detail to the radiological diagnosis of silicosis, but in a recent examination of 600 patients suspected of this disease he had found it most difficult to distinguish between the signs of silicosis and those due to congestion from cardiac weakness. The men were complaining in most cases of dyspnoea only, being elderly and having worked very hard and suffered some injury to their heart muscle which added to the difficulty of diagnosis.

He agreed with Dr. Frank Stephens on the importance of preliminary screening.

In reply to Dr. Watson, he agreed that it was most difficult to distinguish between contralateral congestion and actual infection. The decision depended very largely on intuition born of experience, and this sometimes failed. The final decision as to the activity of lesions should rest

with the clinician, on his biological tests, and the radiologist in most cases should not venture an opinion.

Dr. Douglas Thomas, in reply, agreed with Dr. Penington that in recent and acute intrathoracic lesions there were frequently no reliable radiological signs.

A MEETING OF THE SOUTH AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Anatomy Lecture Theatre, University of Adelaide, on October 26, 1933, Dr. L. C. E. LINDON, the Vice-President, in the chair.

#### Oesophageal Obstruction.

Dr. R. M. GLYNN read a paper entitled: "Oesophageal Obstruction" (see page 329).

Dr. H. A. MCCOY congratulated Dr. Glynn on his interesting and sane handling of a difficult problem—interesting because he had discussed lucidly the various forms of investigation used in the diagnosis and differentiation of the various types of oesophageal obstruction, and sane because he had refrained from making any extravagant claims for any form of treatment of a condition which in the present state of knowledge appeared to be rapidly fatal in 100% of cases.

Dr. McCoy's contribution to the discussion would concern the radiological aspect, both diagnostic and therapeutic. In regard to the diagnostic problem, radiological differentiation of various types of obstruction was fraught with difficulties, and it should be remembered that opaque food outlined cavities only in so far as they were filled; the actual wall of the cavity was not represented by any distinguishable shadow. So in dealing with oesophageal cancer, a spasm of the lumen above the lesion might prevent satisfactory visualization of the lumen traversing the organically affected portion, and the erroneous diagnosis of simple spasm might be made. It had occurred in Dr. McCoy's experience in a woman on whom the oesophagoscope was subsequently passed by Dr. Glynn.

The commonest site for such a mistake to occur was at the lower end, and in all cases in which there was doubt the X ray examination should be delayed for sufficient time to allow opaque food to enter the stomach and to enable the outline of the fundus to be visualized satisfactorily. A filling defect in the region of the cardiac orifice would then indicate the presence of a carcinoma.

If the obstruction was higher in the oesophagus, it was usually impossible to distend with opaque food the lumen below the site of obstruction, and in such cases, if an organic lesion underlay a spasm, sufficient time should be allowed for the spasm to relax, even temporarily, in order that the lumen of the organic lesion might be visualized. A period of more than fifteen minutes might elapse before this occurred. Large doses of atropine might relax such spasms.

Regarding the series of cases reported by Brown Kelly, of congenital stenosis of the oesophagus associated with diaphragmatic hernia of the stomach, he demonstrated in Case IV, that of a patient aged four weeks, the existence of the stenosis and the hernia after introducing barium through the oesophagoscope.

The spasms to which reference had been made required careful and prolonged X ray investigation, as already indicated.

Cardiospasm was frequently associated with enormous dilatation of the oesophagus. In one case seen at the London Hospital the outline of the oesophagus distended with food and fluid could be seen bulging on either side of the heart shadow before any barium was given. A residue of barium twenty-four hours after administration was not uncommon in such advanced cases. Usually the barium shadow terminated as a cone from which fluid passed in a thin stream in intermittent spurts. Solid food might collect in the oesophagus above a spasm and produce a filling defect suggesting newgrowth. Lavage through a stomach tube might be necessary to eliminate such an error.

The differentiation of obstructive lesions due to extrinsic and intramural tumours gave rise to

interesting radiological speculation. Generally speaking, tumours outside the oesophagus might cause obstruction by compression of the lumen, which was usually deflected from its normal course, and it might be possible to visualize the outline of the tumour with the barium-filled oesophagus stretched over its surface. In such cases, if peristalsis was visible, the passage of waves through the constricted portion of the lumen would indicate the absence of neoplastic invasion of the wall of the oesophagus. Peristaltic waves stopped short of a newgrowth of the oesophageal wall and in favourable cases might be observed in the portion distal to the tumour. Such observations might be made only in cases in which the obstruction was not extreme and in which a continuous flow through the stricture was permitted.

The oesophageal pouch was characteristically rounded in shape and the overflow from the upper surface might be observed as a trickle through the compressed oesophageal lumen.

With regard to treatment, Dr. McCoy would refer only to the irradiation treatment of carcinoma of the oesophagus. It appeared from Dr. Glynn's survey of the problem at present that at best they could hope for palliation of the patient's symptoms in the majority of cases. He quoted favourable results from surgical excision of lesions situated in the cervical portion, but for newgrowths of the thoracic portion he offered but scant hope. He even classified the results of surgical removal in the same woeful category as those obtained in attempts at irradiation. And in this they were bound to agree with him, for it appeared from the literature that the percentage of favourable results in all attempts at radical treatment was extraordinarily low. Surely, however, they should not extinguish that faint ray of hope which emanated from a mass of literature reporting occasional temporary amelioration of symptoms. Dr. Glynn offered an alternative method of palliation by intubation which was obviously justifiable on the ground that the patient might be fed and relieved of symptoms of starvation. It appeared, however, that death was inevitable and was caused in the majority of cases by the local lesion. Dissemination was comparatively late, and if they could destroy the primary tumour they might in many cases of carcinoma of the oesophagus effect a cure.

Dr. McCoy suggested that carcinoma of the oesophagus was an epithelioma, and, given comparable conditions of blood supply, it should react to irradiation as did epithelioma in other parts of the body. The great limiting factor in the case of oesophageal tumour was apparently its inaccessibility.

Reference to cases reported by Guisey suggested that in favourable cases the tumour was accessible to radium. And all authorities had suggested that the total length of the tumour should be submitted to efficient radiation. It remained, therefore, to determine with reasonable accuracy the total extent of the lesion. If that could be attained with modern refinements of technique, it was justifiable to irradiate the tissues with 1.5 millicuries destroyed per centimetre of length of tumour, employing a filter of 1.5 millimetres of platinum at least. This dose of radium, combined with deep X ray therapy to the thorax, appeared from the literature to be a rational procedure.

Dr. Glynn had referred to several patients treated with radium at the Adelaide Hospital. These comprised a first attempt and each patient received relatively a small dose of radium. It appeared justifiable to employ larger doses in future attempts.

A Souttar's tube within the oesophagus would supply a suitable vehicle for radium apparatus of sufficient length to irradiate the whole tumour. It appeared to remain, therefore, to those skilled in the use of the oesophagoscope to attempt adequate irradiation of oesophageal neoplasms.

#### MEDICO-POLITICAL.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Medical Society Hall, East Melbourne, on February 7, 1934, Dr. GERALD WEIGALL, the President, in the chair.

### Financial Statements.

DR. C. H. MOLLISON, the Honorary Treasurer, presented the statement of receipts and payments of the Victorian

Branch of the British Medical Association and of the Medical Society of Victoria for the period January 11, 1933, to January 11, 1934. The statements, which are published herewith, were adopted.

**BRITISH MEDICAL ASSOCIATION (VICTORIAN BRANCH).**

**Statement of Receipts and Payments for Period from January 11, 1933, to January 11, 1934.**

		RECEIPTS.			
		£	s. d.	£	s. d.
January 11, 1933—					
To	Balance, National Bank of				
	Australasia, Limited .. ..	526	8 5		
"	Cash in hand .. ..	12	0 0		
		<hr/>		538	8 5
January 11, 1934—					
"	Subscriptions—				
	Metropolitan .. ..	3,585	18 11		
	Country .. ..	1,585	5 2		
	Junior .. ..	333	19 10		
		<hr/>		5,505	3 11
"	Typewriting Department ..			37	14 9
"	Benevolent Fund .. ..			0	5 6
				<hr/>	
				£6,081	12 7

		P A Y M E N T S.					
January 11, 1934—		£	s.	d.	£	s.	d.
By Medical Society of Victoria ..					2,531	18	7
" <i>The British Medical Journal</i> ..					1,667	12	3
" Rebates to Subdivisions .. ..					51	3	3
" Salaries—							
Secretary .. .. .		796	5	0			
Typist .. .. .		137	11	8			
Library Assistant .. ..		114	10	11			
					1,048	7	7
" Postages, Duty Stamps <i>et</i>							
<i>cetera</i> .. .. .					123	6	7
" Printing .. .. .					34	9	2
" Stationery .. .. .					35	0	3
" Commission .. .. .					29	14	5
" Advertising .. .. .					10	10	0
" Audit Fee .. .. .					5	5	0
" Telephone .. .. .					10	15	10
" Legal Expenses .. .. .					33	12	0
" Bank Charges <i>et cetera</i> .. ..					2	4	2
" Electric Light and Power ..					3	16	9
" Federal Committee Expenses					64	9	0
" Lanternist .. .. .					3	10	0
" Sundries .. .. .					29	1	3
" Balance, National Bank of Aus-							
tralasia, Limited .. .. .		354	16	6			
" Cash in hand .. .. .		12	0	0			
					366	16	6
					£6,081	12	7

Compared with the Books and Accounts of the British Medical Association (Victorian Branch) and found to be in accordance therewith.

C. STANTON CROUCH, Secretary.

**J. V. M. WOOD & COMPANY,**

C. H. MOLLISON, Honorary Treasurer.

Chartered Accountants (Aust.).

Melbourne, January 24, 1934.

**MEDICAL SOCIETY OF VICTORIA.**

**Statement of Receipts and Payments for Period from January 11, 1933, to January 11, 1934.**

RECEIPTS.		£	s.	d.
January 11, 1934—				
To Transfer from British Medical Association, Victorian Branch .. ..		2,531	18	7
" Balance, National Bank of Australasia, Limited .. .. .		104	4	5
		<b>£2,636</b>	<b>3</b>	<b>0</b>

	PAYMENTS.		£ s. d.		£ s. d.	
January 11, 1933—						
By Balance, National Bank of Australasia, Limited .. ..					164	14
January 11, 1934—						
" THE MEDICAL JOURNAL OF AUSTRALIA .. .. .					1,579	17
" Interest on Building Fund Debentures .. .. .					421	15
" Salaries—						
Library Clerk .. .. .	72	0	0			
Caretaker .. .. .	100	0	0			
					172	0
" Library, Journals and Binding					172	10
" Rates, Taxes and Insurance ..					27	10
" Light and Power .. .. .					3	16
" Audit Fees .. .. .					5	5
" Telephone .. .. .					10	15
" Entertainment .. .. .					11	13
" Bank Charges .. .. .					6	8
" Repairs .. .. .					35	18
" Sundries .. .. .					23	16
					£2,636	3

Compared with the Books and Accounts of the Medical Society of Victoria and found to be in accordance therewith.

C. STANTON CROUCH, Secretary.

**J. V. M. WOOD & COMPANY,**

C. H. MOLLISON, Honorary Treasurer.

Chartered Accountants (Aust.).

Melbourne, January 24, 1934.



## NOMINATIONS AND ELECTIONS.

THE undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

McQueen, George Hugh, M.B., B.S., 1928 (Univ. Melbourne), Rabaul, New Guinea.

## Medical Societies.

## THE PUBLIC MEDICAL OFFICERS' ASSOCIATION OF NEW SOUTH WALES.

THE eighth annual general meeting of the Public Medical Officers' Association of New South Wales was held on January 30, 1934, at the British Medical Association House, 135, Macquarie Street, Sydney. Inclement weather resulted in a poor attendance, only seventeen members being present, and five were represented by proxies. Dr. S. EVAN JONES occupied the chair.

Apologies for absence were received from the President, Dr. R. J. Millard, and from Dr. Machin and Dr. Nowland.

## Annual Report.

The Secretary presented the annual report for the year 1933, which, after discussion was adopted. The report is as follows:

1. The industrial depression in New South Wales lessened somewhat during the year 1933. The Association therefore began an active policy, but as the times proved still inopportune little progress has been made and the year as a whole has been as inactive as its predecessor.

2. The political and financial position improved sufficiently to enable the New South Wales State Health Department to embark upon a progressive programme. While this progress is welcomed, the Association cannot refrain from taking exception to some of the arrangements proposed. It has been noted that several new positions have been created with junior status and low remuneration, but senior qualifications have been required of applicants, the intention apparently being to employ them on senior work in the department. It is considered that the Association should continue to affirm the principle that no new position should be created in the services unless it is fully warranted in the public interest and for such a position an adequate rate of remuneration should be insisted upon.

3. The membership roll of the Association now contains 84 names. Some events during the year show that a strong and active Association is necessary to safeguard the careers of its members.

4. The committee met 11 times during the year, the attendances of members being as follow: Dr. R. J. Millard (President), 11; Dr. Chas. Badham, 5; Dr. S. Evan Jones, 7; Dr. W. K. Flook, 7; Dr. M. R. Finlayson, 9; Dr. Dorothy McClemens, 7; Dr. E. L. Morgan, 8; Dr. H. H. Nowland, 5; Dr. C. E. Percy, 11; and Dr. H. H. Willis, 11.

5. Our relations with the British Medical Association and other service organisations remain cordial and unchanged. It is considered that closer cooperation with such bodies will be necessary in the near future. With the New South Wales Public Service Board our relations are not satisfactory. Since April, 1933, representations have been made to the Board for a declaration of its policy, for an interview, and for a renewal of our salaries agreement, and to each request the Board has adopted an attitude of passive resistance.

6. Only three circulars were distributed to members during the year. While this reflects to a certain extent diminished activity, there were many matters which engaged the attention of the committee which could not appropriately be communicated to members.

7. Late in the year the Association was asked by the New South Wales Public Service Board to nominate, in

accordance with Public Service Regulation 51, a member of a Promotions Committee in the Department of Mental Hospitals. Dr. J. A. L. Wallace, a former President of the Association, kindly consented to act in this capacity.

8. The annual social function was a picnic at the Quarantine Station, North Head, on Saturday, November 18. Fourteen members and their parties spent an enjoyable day and much appreciated the courtesy of the Chief Quarantine Officer, Dr. A. J. Metcalfe, who personally conducted the party around the buildings in the afternoon.

9. The Association's agreement with the Public Service Board of New South Wales expired on June 30 last, and so far the Committee has been unable to negotiate its continuance. Influenced by the improved financial position of the Federal and State Governments, and by the repeated assertions of public men that prosperity was "around the corner", the Association has asked for increases in salary for certain of its members. The Board has refused to accede to these requests.

10. Our members in the New South Wales services suffered another reduction in salary during the year following upon a further drop in the State basic wage, but received later slight relief from the burden of unemployment relief taxation. Our Federal members were fortunate in benefiting by a diminution by 2½% of their salary cuts under the *Financial Emergency Act*, and by a restoration of an excess "cost of living" deduction.

11. In accordance with the instructions of the annual meeting of January, 1933, the Committee has communicated to the New South Wales Branch of the British Medical Association its comments on that Association's draft hospital policy for New South Wales. The Committee finds nothing objectionable in the policy as finally adopted by the Branch, and will watch with interest the steps taken to enforce it.

## Financial Statement.

The Honorary Treasurer, Dr. E. L. Morgan, presented the annual financial statement, which showed receipts of £20 12s. 6d. from subscriptions and £9 4s. 2d. as interest on invested funds. Expenditure totalled £7 16s. 3d., and the credit balance at the end of the year was £400 11s.

A hearty vote of thanks was accorded Dr. Morgan, who expressed a wish to be relieved of the duties of treasurer after seven years of service in that capacity.

## Election of Office-Bearers.

The election of office-bearers resulted as follows:

*President:* Dr. H. H. Nowland.

*Secretary:* Dr. H. Hastings Willis.

*Auditor:* Dr. Elsie J. Dalyell.

*Treasurer:* Dr. C. E. Percy.

*Committee:* Dr. J. A. L. Wallace and Dr. S. Evan Jones (Mental Hospitals), Dr. W. K. Flook and Dr. Dorothy McClemens (Education Department), Dr. M. R. Finlayson (Works and Railways), Dr. Chas. Badham, Dr. E. L. Morgan, Dr. C. E. Percy (New South Wales Health Department), and Dr. H. H. Willis (Repatriation Department).

## Members and the Public Service.

Dr. H. H. Willis moved:

That the Committee be instructed to consider the desirability of seeking an amendment of the New South Wales *Public Service Act* to insure security of tenure of office to public medical officers.

He desired a discussion of this subject to inform the Committee of members' views. Recent events had obliged him to study the matter, and he had found that many members of the Association had no security of tenure at all, whilst the majority were under a misapprehension as to the extent of the protection given them by the New South Wales *Public Service Act*. There was a growing tendency for political personages to interest themselves in purely medical matters not in any way connected with politics or policies. Among political personages were not

only ministers, who sometimes exercised a right to intervene in the routine administration of their departments, but also members of Parliament and even party organizers and political agents, and the activities in which they interested themselves were not only the doings of high administrative medical officers who might expect to encounter politicians in their worthy efforts to pursue a continuous constructive policy, despite frequent changes of ministers and ministries, but even those of junior members of the services performing purely medical work. It seemed quite possible for a medical man honestly and efficiently doing his duty to the sick under his care to offend some individual who, either himself or through his friends, had political influence which he was prepared to use in an attempt to secure the medical officer's dismissal. This was surely a very wrong state of affairs, and he would like members to indicate what action, if any, the Committee should take to right it. Acts and regulations could give some protection, but he was inclined to agree with a past president of the Association who had said that the backing of a strong and active service organization was the best protection a public servant could have.

Dr. E. Sydney Morris seconded the motion *pro forma* because he thought the matter worthy of discussion. Dr. Willis had correctly stated the present position. Some medical officers were suffering from a sad delusion as to the extent of the security given by the *Public Service Act* and Regulations. However, he did not think any useful purpose would be served by attempts to have the Act altered. In practice members would find that they had as much security as probably would be granted to them as servants of the public. Exceptional cases might arise in which an attempt might be made to victimize a medical officer, but he thought that in such circumstances the victim would have the backing of the entire Public Service, which was not a negligible factor. Perhaps the committee could negotiate with other service organizations to insure that such backing would be forthcoming when any medical officer found himself in difficulties through no fault of his own.

Dr. Morgan thought that the New South Wales Act and regulations gave adequate protection and that no useful purpose would be served and possibly some harm done by pursuing the matter. He urged the meeting to reject the motion and asked that a vote be taken.

The Chairman put the motion and pointed out that the Committee would take its rejection as an instruction not to take any action in the matter.

Dr. Morris hoped that if the motion were carried the Committee would again consult members before taking action. The motion instructed the Committee to consider not to act.

The motion was carried, there being two dissentients.

#### The Library of the New South Wales Branch of the British Medical Association.

Dr. Chas. Badham proposed that the Association donate £5 5s. to the library of the New South Wales Branch of the British Medical Association. He said he found that library very useful to him in his work, and he thought many other public medical officers also found it useful. However, it was badly in need of funds to make it more useful and he thought the Association should do something to help it.

Dr. Willis said that the Committee had learned during the year that the Branch library needed donations, but the Treasurer was not satisfied that it could under the constitution of the Association authorize such a gift. He thought the expenditure could be defended as being in furtherance of the object "to promote the efficiency, medical qualifications, and professional prestige of its members", and if the meeting endorsed that view he thought the Auditor could raise no objection.

Dr. S. Evan Jones said the establishment of a first class medical library in Sydney was a very necessary thing and he admitted that the Branch library would need to have quite a lot of money spent upon it before it could merit that description. He doubted whether so small a sum as

£5 5s. would be appreciated by the Library Committee, and the Association needed as much money as possible for its fighting fund. If many organizations gave £5 or £10 each year a sum could be available which would finance many necessary improvements, but the Library Committee seemed to have shown little enthusiasm during the past year. The section of the Branch with which he was associated had offered to defray the cost of certain journals of special interest to its members, but the Library Committee had not so far availed itself of the offer.

Dr. J. A. L. Wallace said the Section of Neurology and Psychiatry had offered eighteen months ago to subscribe to certain journals for the library and that advantage had not yet been taken of the offer.

Dr. Cooper Booth pointed out that though the donation proposed was small, it was 25% of members' subscriptions at the present rate of subscription. If every interested body devoted one-quarter of its members' subscriptions to the library a valuable sum would be available.

Dr. E. Sydney Morris thought the donation should be offered as a friendly gesture and a token of the Association's interest in the Branch library. Such a practical expression of appreciation might encourage the Library Committee and might serve as an example to other sections of the profession to make similar donations.

The motion was carried.

## Obituary.

### WILLIAM ROBERT BOYD.

Dr. WILLIAM ROBERT BOYD, whose death was recorded in a previous issue of this journal, was born at Bendigo, Victoria, in June, 1865. He received his early education at the State School and at the High School, Bendigo. He was the son of the late James Boyd, a medical practitioner who practised in Bendigo. He studied medicine at the University of Melbourne and graduated with honours in 1886. He took the degree of Doctor of Medicine in 1891.

After graduation Boyd became a resident medical officer at the Melbourne Hospital in 1887. He then went to England for post-graduate study and acquired the diploma of membership of the Royal College of Surgeons of England in 1889. Returning to Melbourne shortly afterwards, he became honorary physician to out-patients at the Melbourne Hospital; in 1904 he was appointed physician to in-patients; and in 1922 he joined the honorary consulting staff.

For a period of many years Boyd gave of his best to the Victorian Branch of the British Medical Association. He served on the Council and occupied the honourable position of President. The Branch is the proud possessor of a bust of William Robert Boyd, presented by a friend in 1929. He will be remembered with gratitude by the members of his own profession as well as by a larger circle of those beyond it.

Dr. B. T. Zwar writes:

By the passing of Dr. W. R. Boyd the medical profession of Victoria has lost one of its most respected and beloved members. As one who had the privilege of close association in many of his activities I welcome the opportunity to pay a tribute to his memory.

To know that W. R. Boyd is with us no more is to feel a sad break with the past and to be sensible of a gap. To few medical men in practice has it fallen to be more beloved by his patients and to be held in higher esteem by his colleagues. It was an outstanding characteristic of Boyd to make the well-being of his patients an ever-present consideration; he would spare himself no trouble to obtain for them the best possible treatment. In order to achieve this he would not hesitate, when necessary, to obtain the appropriate help. When Boyd sought a consultation it definitely was for the purpose of elucidating some obscure point or problem. He had a remarkably acute mind, especially in a medico-legal

direction; the solving of problems, medical or medico-legal, seemed a real joy to him. He kept himself well informed of all advances and of all modern developments in both medicine and surgery. Up to the very week during which he was stricken by his short fatal illness it was a characteristic sight to see him in his car being driven along a busy street, sitting back, intently engaged in the study of some scientific journal or book.

W. R. Boyd possessed outstanding attainments which would have qualified him for a successful consulting physician, but he probably conferred upon the community a far greater service as a general practitioner. The manner in which he carried out his work must have extended in its influence far beyond the confines of his large practice and set an inspiring example to many a colleague in general practice.

The same devotion to duty, the same desire to do the best for those under his care, characterized his work in the Melbourne Hospital. The persistence with which he stuck to a difficult or anxious case, together with his cheering manner, frequently helped such a case to a successful issue. He was early to recognize the value of surgical intervention in conditions which at the time were regarded as purely medical, though they since have passed into the realms of surgery. As an example, I need only mention his early advocacy and practice of securing surgical treatment for toxic goitre.

Boyd was a wonderful trainer of house physicians. He aimed to inspire them with the same ambition to do the best, the very best, for those under their care, and in this he usually succeeded.

The medical profession in Victoria is under a great debt of gratitude to W. R. Boyd. For many years he gave much time, thought and advice on the Council of the Victorian Branch of the British Medical Association. He was President of the Branch during a particularly critical period of its existence. It was mainly due to his efforts and to the attitude maintained by him that the settlement of the lodge dispute through the Wasley award was reasonably satisfactory to the medical profession in Victoria.

He was a much valued member of the Council of the Medical Defence Association of Victoria, and although he refused to accept nomination for the position of president of that body, he made it his business to master the details of every difficult case and spared no effort to safeguard the interests of members and to repel unjust attacks upon them.

With his active help and advice he contributed a great deal to cause the abandonment of the former most objectionable method of electing the medical staff of the Melbourne Hospital by the open vote of subscribers, and to replace it by an election based on the advice of a specially qualified board, a method since adopted by

practically all the metropolitan hospitals in Victoria and one which has proved itself highly satisfactory from everyone's point of view.

His advice and influence in the establishment and administration of Bethesda Hospital have been productive of great benefit to the medical profession and to the community of this State.

To those who knew W. R. Boyd his life will remain an inspiration. Our only consolation in his loss is the thought that he died, as he would have liked, in harness.

His death has deprived us of a most lovable friend, a wise counsellor and an eminent and inspiring colleague.

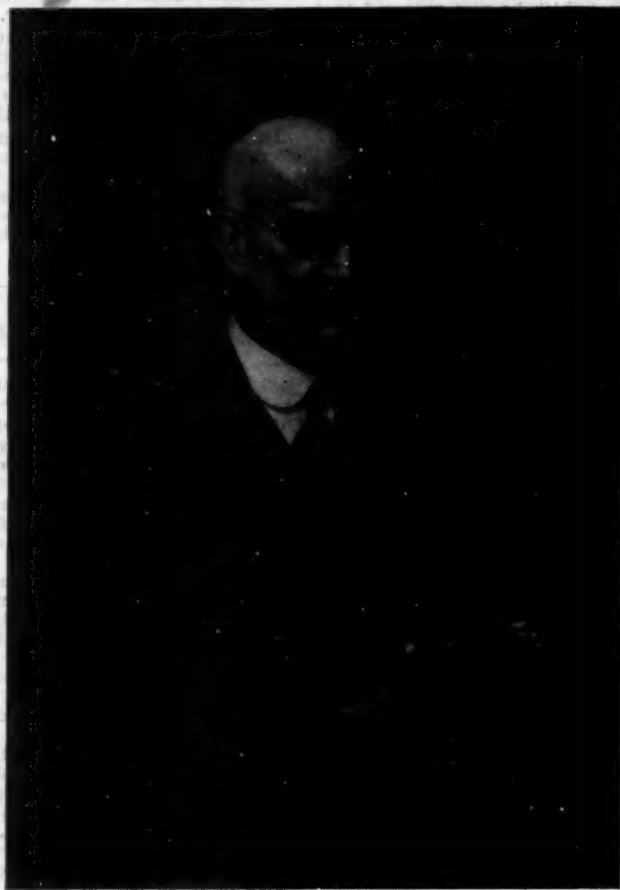
Major C. S. Cunningham writes:

The passing of Dr. William Robert Boyd, "Dr. Willie" to his polite friends, and "Dr. Bill" to his intimates, caused many an aching heart in a host of not only grateful, but lovingly grateful, patients and innumerable friends. It is not exaggeration to say that no man in Melbourne was more widely known or more universally esteemed than the late W. R. Boyd. He has been described by one of the older generation as a lovable boy and an admirable man, and with the latter part of that description there will be no dispute among the younger generation. No one, not even the members of his own family, knows the full extent of his benefactions to the poor among his patients, especially to the kiddies, whom he loved. He was a staunch friend, had a strong sense of right, and was fierce only when fighting for a principle. A lover of amateur sport, he was a familiar figure at the Melbourne Cricket Ground with his English Setter when cricket or school sports were on. If there was ever a doubt concerning his popularity, it was soon dispelled for anyone seeking unbroken conversation with him.

Someone passing would greet him: "Hullo, Doctor", and before many words had passed between them another would join them until he was the centre of a group. At Lorne, where he spent a month each year, he was popular with everyone, even those charged with the health conditions of the township, towards whom he was unrelenting for their shortcomings. In his younger days he was a keen tennis player and fond of bicycling jaunts, but for many years he had found recreation in fishing and duck and quail shooting. Dr. Boyd had a well developed sense of humour and among his many stories he told none with so much relish as those in which the part was against himself. He has passed, but his work lives.

PERCY OSWALD LORD.

We regret to announce the death of Dr. Percy Oswald Lord, which occurred at Hawthorn, Victoria, on March 2, 1934.





## Correspondence.

## PHYSICS FOR MEDICAL STUDENTS.

SIR: Although the review in THE MEDICAL JOURNAL OF AUSTRALIA of January 20, 1934, of "Physics for Medical Students: A Supplementary Text Book" by Mr. J. S. Rogers in some passages appears to approve of specialized teaching in physics for medical students, in other places it appears to condemn it. If the reviewer does not really doubt in his own mind the value of such teaching the relevance of the following passage from the review is not evident:

"Now listen to me," said a prosperous gold-miner when entering his son for a course of instruction in mining at a well known Australian school of mines. "I don't want the lad to waste his time learning geometry and drawing and chemistry and all such useless stuff. I want him to get right on to gold." This extreme practicality of outlook in matters educational is by no means confined to gold-miners. Similar views are sometimes expressed by members of more learned professions. There has always been and always will be conflict of ideals between the academic and professional viewpoints in education, the former aiming at giving a thorough scientific foundation to the technical knowledge of the student, the latter at teaching him only what is practically useful. The book before us is written from the practical viewpoint, but within the limitations that such a viewpoint imposes the treatment is thoroughly scientific; and it must be admitted, even from the academic aspect, that there is much to be said for a selection of material which engages the interest of the student by reason of its relevance to his future professional activities.

I desire to discuss how physics should be taught to medical students, not as editor of "Physics for Medical Students," but as head of a laboratory in which there are medical students. Medical students in Melbourne University until about 1920 studied the same course and attended the same lectures in physics as other first year students. There was sufficient evidence that this course, which was intended to have logical completeness and unity in its treatment, failed to interest many medical students, and I believe this is the experience of other universities. Now, there are few worse defects in teaching than failure to interest those taught. What is the reason for this lack of interest? It is not because physics has no relation to the medical students' other studies, for it is relevant to chemistry, to physiology and to some methods of medical diagnosis and treatment. Can the first year medical student be expected, however, to appreciate the value of what is contained in many text books intended for his use, and, presumably, they represent the content of courses of lectures given in many medical schools? In the first place they appear to have little relation to anything in which he is specially interested, they are often abstract in their whole treatment of physics, and have little or no cultural interest. Are these necessary characteristics of a logical and scientific treatment of physics? I do not think they are, and two illustrations are given later of how the treatment may be made more real and more scientific.

Abraham Flexner in his "Medical Education—a Comparative Study" criticizes the teaching abroad of physics and chemistry and says that the three basic sciences of the medical curriculum have been "taught on an elementary basis at distinctly a schoolboy level, and in a mechanical and humdrum rather than in an imaginative and scientific spirit." "It would be difficult to imagine anything less likely to open the students' eyes to the fundamental significance of these studies for medicine . . ." In Australia I believe the teaching of physics has always been at a considerably higher level than that referred to by Flexner, but if the fundamental significance of physics to medicine is to be realized by the first year student, that significance must be clearly brought out by his physics teacher, and the text books which he uses.

In the conventional teaching of hydrostatics the general principles are stated and their applications to the hydraulic press and to the flotation of boats are given. These applications are of importance to the engineer, but not to the medical man. In our medical course after the principles of hydrostatics are dealt with, the application which is discussed is the measurement of blood pressure, which involves a number of interesting applications of physical principles. A further advantage in the discussion of this application is that it is not found in every text book, nor is it discussed in every school. In the treatment of the principle of the conservation of energy its application to the human body is discussed with the medical class. If the members of the class succeed in understanding this application, and many students do, they have made some progress towards understanding what is possibly the most important principle of physics. Will the treatment of conservation of energy in any first year text book do more or as much as this for its readers?

There are many aspects of medicine and surgery in which the underlying physical principles are important. Without attempting to enumerate those essential to the study of physiology, there is the technique of the measurement of hydrogen ion concentration, the reception of sound by the ear, the recording of light by the eye, the use of X rays in the diagnosis and treatment of disease, and the application of high frequency currents in treatment and surgery. Who is to teach the physics of these subjects if they are not included in the first year? Are they to be left to the clinicians who lecture on the specialities mentioned? It is, of course, the function of the physiologist to teach biophysics, but will not his task be lightened if his students come to him with some correct conceptions on osmotic pressure, on the properties of colloids, on the conservation of energy in the human body, *et cetera*?

There appear to be many considerations in favour of the first year physics course including a scientific treatment of the more general physical principles underlying the specialities which have been mentioned. Only those students will be able to follow such a treatment who have had a sound training in physics. It is impossible to cover all of the specialities in detail in lecture. "Physics for Medical Students" was written in order to make that unnecessary, and the examinations at the end of last year disclosed that the students who used it had studied it with quite unexpected thoroughness. Time alone will show to what extent they have understood the principles expounded in it.

Yours, etc.,

T. H. LABY.

The University of Melbourne,  
February 28, 1934.

## A CORRECTION AND A COMMENT.

SIR: In the *résumé* of the proceedings of the Ophthalmological Section at the Hobart Congress there are one or two errors. The remarks on page 277 of the journal of February 24 attributed to Dr. Guy Pockley were made by me. In the second paragraph, lines 8 and 9, "He had many interests. In only one had there been unanimity," should read, "He had known many instances. In only one had there been unanimity."

In that instance a strong Council commanding the loyal support of members gained a complete victory on the question of the wage limit, and the exclusion of the Australian Natives Association and other associations.

With a virile council, including some with business heads, a strong man as president, and support of the members, which such a council would insure, there is no object affecting the profession that could not be attained. There is evidence that these elements have been lacking, with consequent failure of achievement. The practice under which the councillor with longest service automatically becomes president does not always secure the best man for the job. It was different in former days when men like MacLaurin, Sydney Jones, Chambers, Clubbe, Foreman, Rennie, to mention only a few—all

eminent and widely known men, with strong personalities—and a few others still practising whom I shall therefore not name. Without strong men with capacity for leadership I can see no hope of countering the trend towards nationalization of the profession. For one thing we should never let the management and control of our own affairs pass out of our hands.

In a former letter published in the journal of February 11, 1933, I indicated the National Roads and Motorists' Association as an example of what can be achieved and of service to the public by cohesion and keeping the management of its affairs in its own hands. Since then it has gone on from success to success.

These are matters which will specially affect the rising generation of practitioners (the older, established men cannot be expected to go on bearing the burden and heat of the fray). It is for the former to act, and promptly. It is perhaps not too late.

Yours, etc.,

F. ANTILL POCKLEY.

Wahroonga, N.S.W.,  
February 24, 1934.

### Diary for the Month.

- MAR. 13.—New South Wales Branch, B.M.A.: Medical Politics Committee.  
MAR. 19.—Tasmanian Branch, B.M.A.: Council.  
MAR. 20.—New South Wales Branch, B.M.A.: Council Quarterly.  
MAR. 21.—Western Australian Branch, B.M.A.: Branch.  
MAR. 22.—New South Wales Branch, B.M.A.: Annual Meeting.  
MAR. 23.—Queensland Branch, B.M.A.: Council.  
MAR. 24.—Tasmanian Branch, B.M.A.: Annual Meeting.  
MAR. 27.—New South Wales Branch, B.M.A.: Council: Election of Office-Bearers and Appointment of Standing Committees.  
MAR. 28.—Victorian Branch, B.M.A.: Council.  
MAR. 29.—South Australian Branch, B.M.A.: Branch.  
APRIL 3.—Tasmanian Branch, B.M.A.: Council.  
APRIL 4.—Western Australian Branch, B.M.A.: Council.  
APRIL 5.—South Australian Branch, B.M.A.: Council.  
APRIL 6.—Queensland Branch, B.M.A.: Branch.

### Medical Appointments.

Dr. G. A. Lawrance (B.M.A.) has been appointed Senior Medical Officer, Department of Mental Hospitals, New South Wales.

Dr. A. E. Williams (B.M.A.) has been appointed District Medical Officer by the Denmark Road Board, Western Australia.

### Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xvi, xvii and xix.

- ALFRED HOSPITAL, MELBOURNE, VICTORIA: Medical Officers.  
DEPARTMENT OF DEFENCE, MELBOURNE, VICTORIA: Surgeon Lieutenant.  
INFECTIOUS DISEASES HOSPITAL, FAIRFIELD, VICTORIA: Junior Resident Medical Officer.  
LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officer (male).  
MOOROOONA HOSPITAL, MOOROOONA, VICTORIA: Junior Resident Medical Officer.  
PUBLIC SERVICE COMMISSIONER, ADELAIDE, SOUTH AUSTRALIA: Junior Resident Medical Officer.  
RENWICK HOSPITAL FOR INFANTS, SYDNEY, NEW SOUTH WALES: Resident Medical Officer, Honorary Radiographer.  
ROCKHAMPTON HOSPITALS BOARD, ROCKHAMPTON, QUEENSLAND: Resident Medical Officer.  
SYDNEY HOSPITAL, SYDNEY, NEW SOUTH WALES: Radium Registrar.  
UNIVERSITY OF CAMBRIDGE, ENGLAND: Diploma in Medical Radiology and Electrolgy.

### Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing. Lower Burdekin District Hospital, Ayr.
SOUTH AUSTRALIAN: Secretary, 307, North Terrace, Adelaide.	Combined Friendly Societies, Clarendon and Kangarilla districts. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

### Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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